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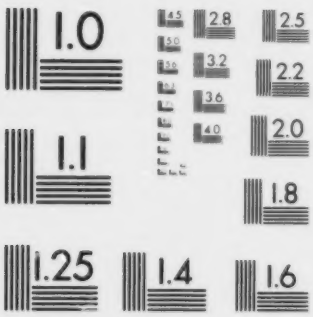

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PREFACE

This paper deals with the relationship between the public and private sectors in the Canadian petroleum industry, particularly in regard to exploration, development and production. It was prepared at the request of the Canadian Institute of Mining in support of the Institute's 1987 Drilling Technology Seminar in the People's Republic of China. It is written from the perspective of Alberta Energy, the energy ministry of the Government of Alberta, although the views expressed are those of the author alone.

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1. THE CANADIAN CONSTITUTIONAL FRAMEWORK

Canada, which is similar in area to China (Figure 1) is a self-governing federation within the British Commonwealth comprising ten provinces and two territories (Figure 2). In the territories all the petroleum and other mineral rights are owned by the federal government in the name of Her Majesty The Queen. In the individual provinces, however, these Crown rights, as they are called, are owned by the provinces themselves except where locally they have been retained by the federal government, are owned by Indian bands pursuant to treaties or were granted historically to trading companies, railways, and early settlers. Settlement of Canada by Europeans occurred generally from east to west and the percentage of rights held by the provinces within their boundaries increases in this direction. In the province of Alberta, 85 per cent of the petroleum and other mineral rights are owned by the province in the name of the Crown and administered by the Alberta Department ("Ministry") of Energy.

This ownership allows the province, by way of provincial legislation, to collect various revenues from the disposition and production of Crown minerals (Figure 3).

Provincial legislation also conveys certain taxation powers to the province, including the ability to tax the production of those minerals which are not owned by the Crown, to tax fuels at their point of end use and to tax other goods and services. For purposes such as petroleum industry drilling and production practices and resource conservation, provincial control extends throughout the province.

Fig. 1. CHINA AND CANADA

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1 ALBERTA
2 BRITISH COLUMBIA
3 MANITOBA
4 NEW BRUNSWICK
5 NEWFOUNDLAND AND LABRADOR
6 NOVA SCOTIA
7 ONTARIO
8 PRINCE EDWARD ISLAND
9 QUEBEC
10 SASKATCHEWAN
11 NORTHWEST TERRITORIES
12 YUKON TERRITORY

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Fig. 2. CANADA - PROVINCES & TERRITORIES

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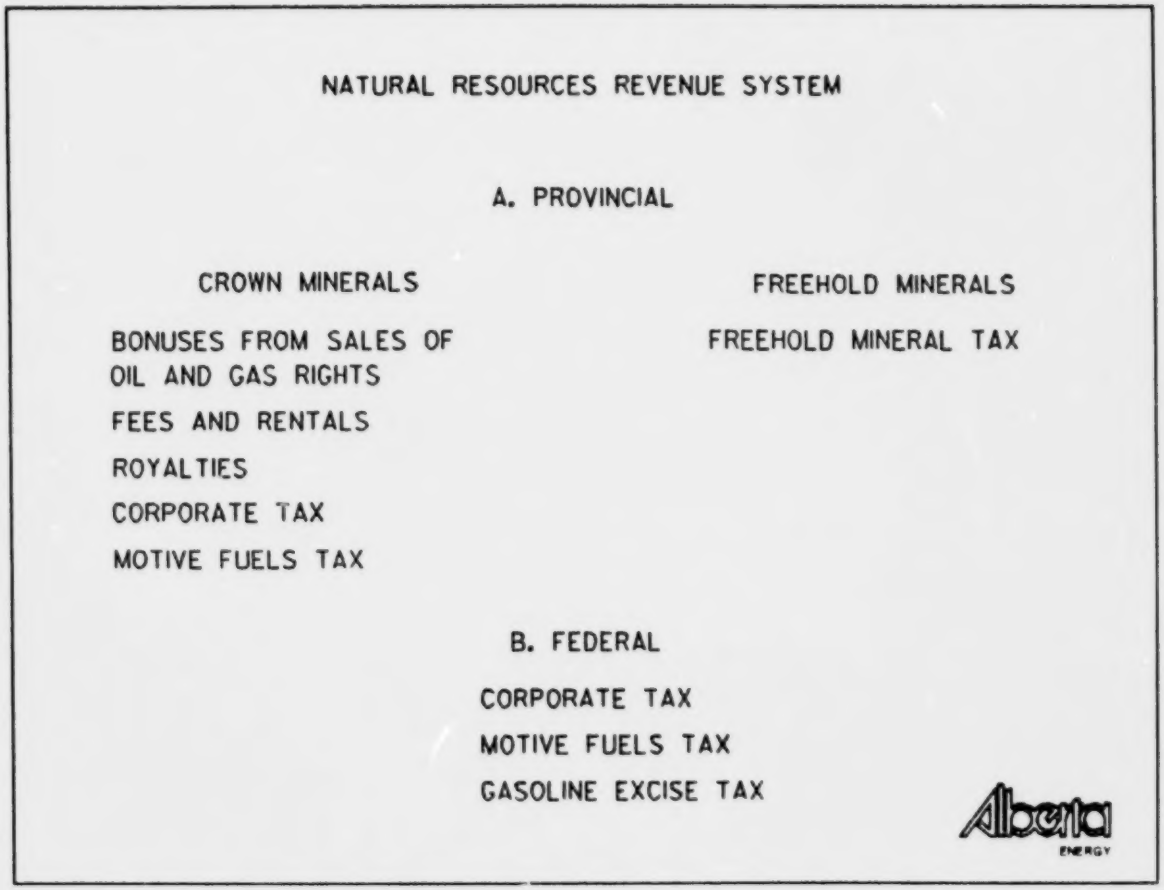


Fig. 3. NATURAL RESOURCES REVENUE SYSTEM

Prepared: 1987 July

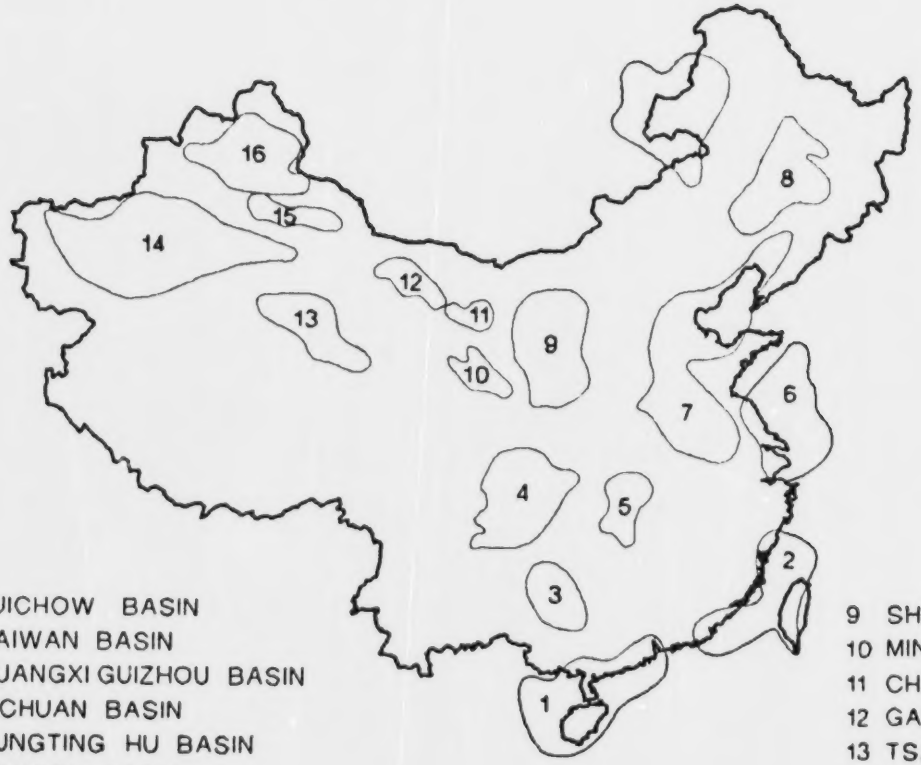
The federal government has wide-ranging powers involving corporate and personal income taxation (both of which are shared with the provinces), and in regard to inter-provincial and international trade. The National Energy Board regulates the construction of inter-provincial and international pipelines and power lines, establishing minimum construction and operating standards and ensuring (in co-operation with provinces) minimal environmental impact. It has the power to expropriate land for these purposes. It also forecasts national energy supply and demand and is empowered to grant licences for the export of energy which is considered to be surplus to "reasonably foreseeable" needs. The Board's relationship with industry is primarily by way of public hearings. Its Alberta counterpart is the Alberta Energy Resources Conservation Board, the responsibilities of which are described later.

2. THE DISTRIBUTION OF PRODUCING AND CONSUMING AREAS IN CANADA AND THE EFFECT UPON ENERGY POLICY

Effective working relationships are essential between provincial governments and the federal government arising, first, from their respective powers, many of which are shared and to which reference has been made earlier and second, from the irregular distribution of petroleum producing and consuming areas within Canada.

The distribution of sedimentary basins in China and Canada differs appreciably (Figures 4 and 5). Within Canada, essentially all oil and gas production currently comes from the western Canada sedimentary basin, 85 per cent of this production originating in Alberta. The population and manufacturing industries of Canada, however, are concentrated in the provinces of Quebec and Ontario, markets which may be readily served by offshore petroleum supplies. To encourage development of the western Canadian petroleum industry, therefore, the "Ottawa Valley line" (Figure 6) between Ontario and Quebec was chosen in 1961 by national policy as the westernmost extent to which offshore crude oil was allowed to penetrate Canada from the east. This policy existed until the early 1970s.

In subsequent years, thanks to a now well-developed western Canadian petroleum industry and pipeline systems (Figures 7 and 8) to eastern Canada and the west coast, fed by a comprehensive network of pipelines within the Province of Alberta (Figures 9 and 10) it became national policy to protect Canadian consumers from rising world prices. Albertans came to see a price for their oil below world price, however, as a significant subsidy of Canadian consumers which far exceeded the



1 LUICHOW BASIN
2 TAIWAN BASIN
3 GUANGXI GUIZHOU BASIN
4 SICHUAN BASIN
5 TUNGTING HU BASIN
6 JIANGSU BASIN
7 NORTH CHINA BASIN
8 SUNGARI-LIAO BASIN
9 SHAANXI BASIN
10 MIN HO BASIN
11 CHAO SHUI BASIN
12 GANSU BASIN
13 TSAIDAM BASIN
14 TARIM BASIN
15 TURFAN BASIN
16 DZUNGARIA BASIN

Fig. 4. CHINA'S OIL AND GAS SEDIMENTARY BASINS

Prepared: 1987 July

SOURCE: Nova Corp.

1 WESTERN CANADA SEDIMENTARY BASIN
2 CORDILLERAN BASINS
3 BEAUFORT SEA - MACKENZIE DELTA
4 ARCTIC ISLANDS
5 EASTERN CANADA - OFFSHORE
6 EASTERN CANADA - PALEOZOIC BASINS

Fig. 5. CANADA'S OIL AND GAS SEDIMENTARY BASINS

SOURCE: Geological Survey of Canada

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Fig. 6. THE OTTAWA VALLEY LINE

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Fig. 7. MAJOR OIL PIPELINES

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Fig. 8. MAJOR GAS PIPELINES

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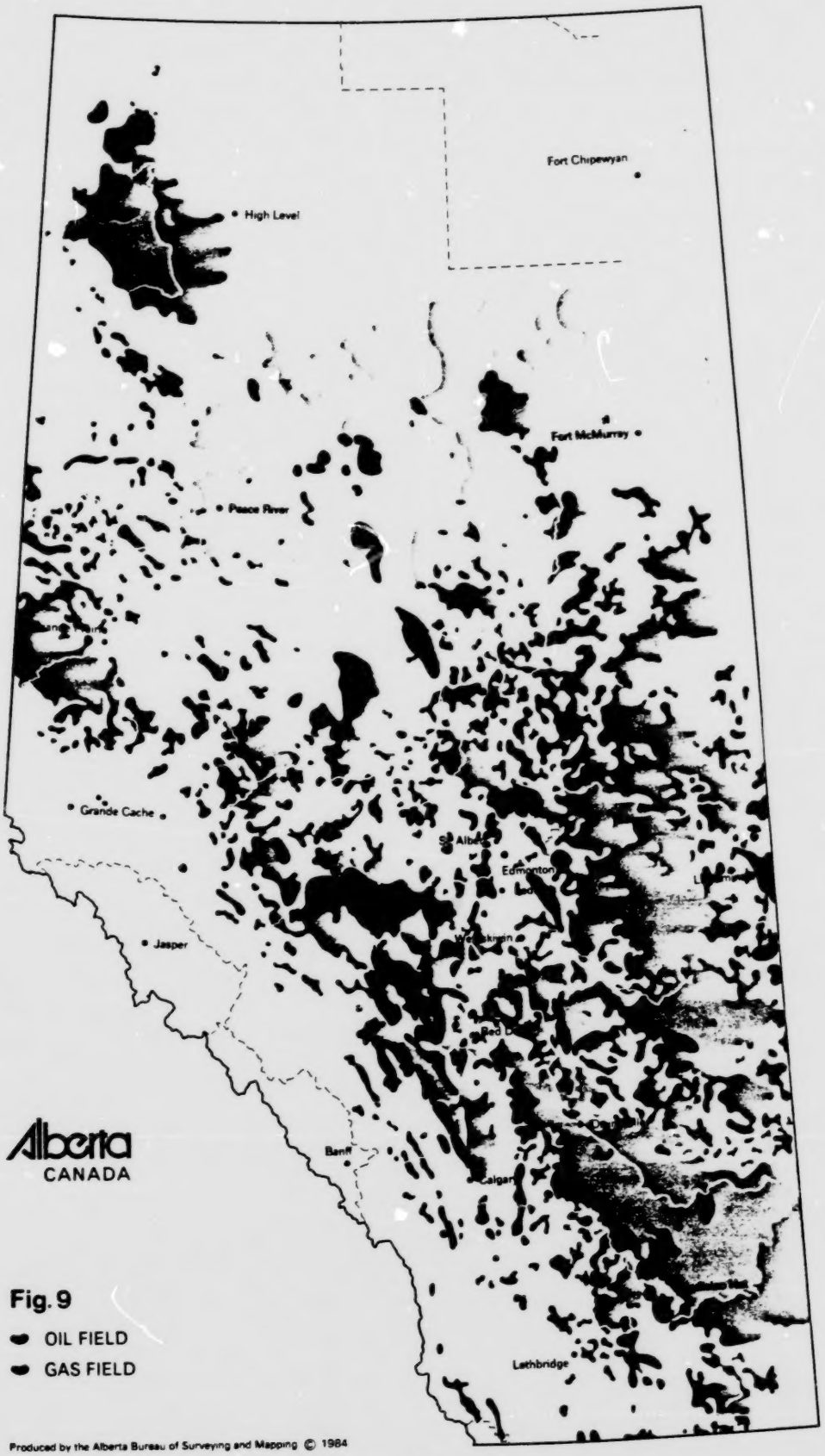

Fig. 9

- OIL FIELD
- GAS FIELD

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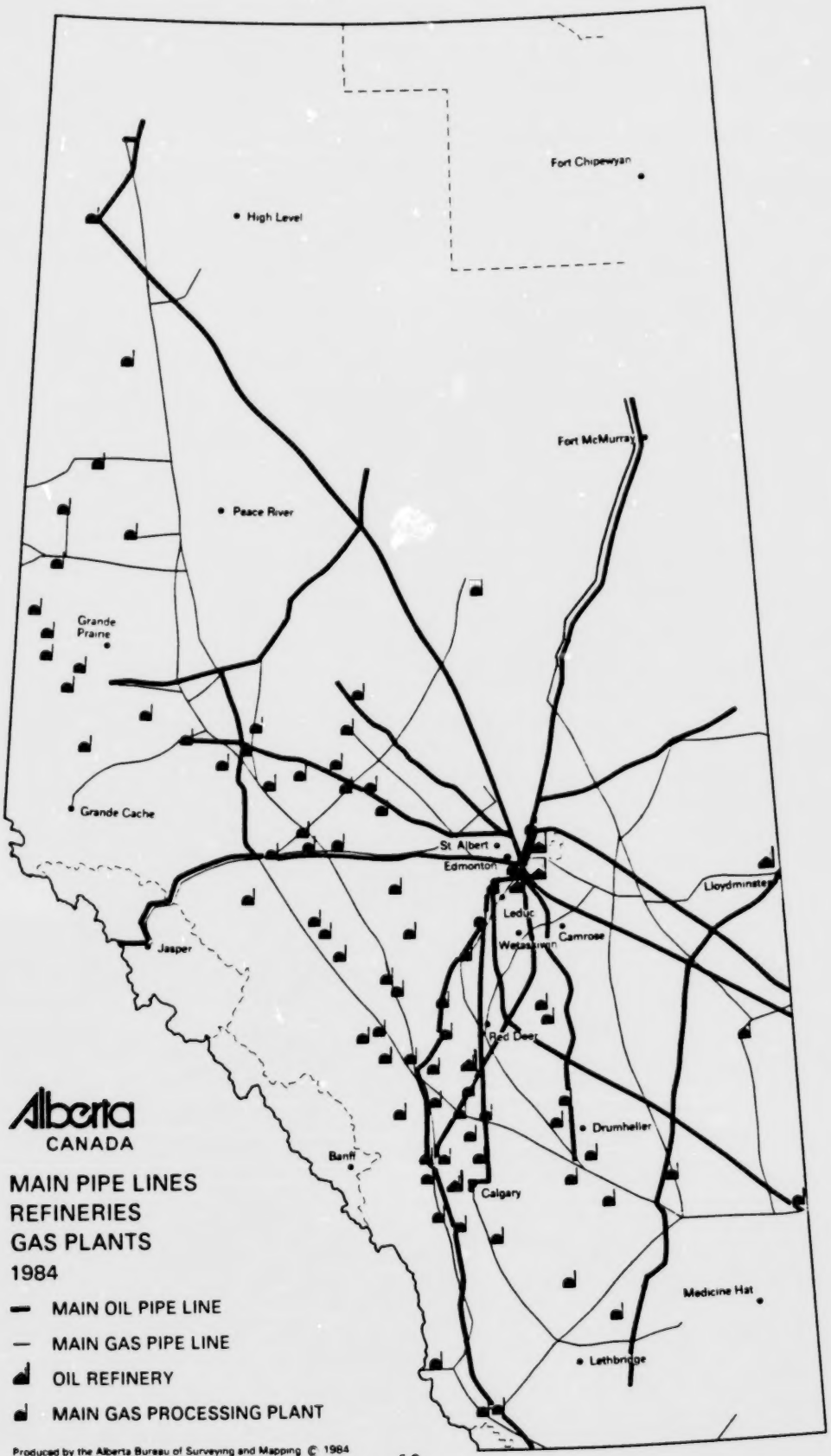

Fig. 10 MAIN PIPE LINES
REFINERIES
GAS PLANTS
1984

- MAIN OIL PIPE LINE
- MAIN GAS PIPE LINE
- OIL REFINERY
- MAIN GAS PROCESSING PLANT

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value of support afforded by the "Ottawa Valley line" in earlier years. Accordingly, following much negotiation, oil and gas pricing and supply constraints have recently been deregulated in Canada. Current movements of oil (Figure 11) and gas (Figure 12) are therefore subject to market fluctuation.

The extent to which a country is immune from the effects of fluctuation and uncertainty in world oil price is dependent first upon the extent to which it buys or sells petroleum in the world marketplace and second, upon the extent to which it requires foreign investment in its own petroleum industry.

In Canada, security of supply has been recognized by the federal and provincial governments as a matter of national concern. Further, the recent drop in world oil price, though now in a recovery phase, had a serious effect upon exploration and development in the Canadian oil industry.

The federal and provincial governments have recognized that if oil were to stay in the range of US $15-20/bbl, Canada would be importing 75 per cent of its oil by 1995. At that level of importation, a foreign supply interruption would have immediate and serious effects upon the economy.

All the oil economists and other experts in the world can do no more than guess what will happen with OPEC supply and price. Should governments therefore attempt to take action - which usually has a short-term cost and may have a long-term cost - to secure their energy supplies?

For Canada, this is a difficult decision to take, particularly at a time when the country is attempting to reduce high levels of national debt and, as mentioned above, appreciable industry pricing deregulation has recently taken place.

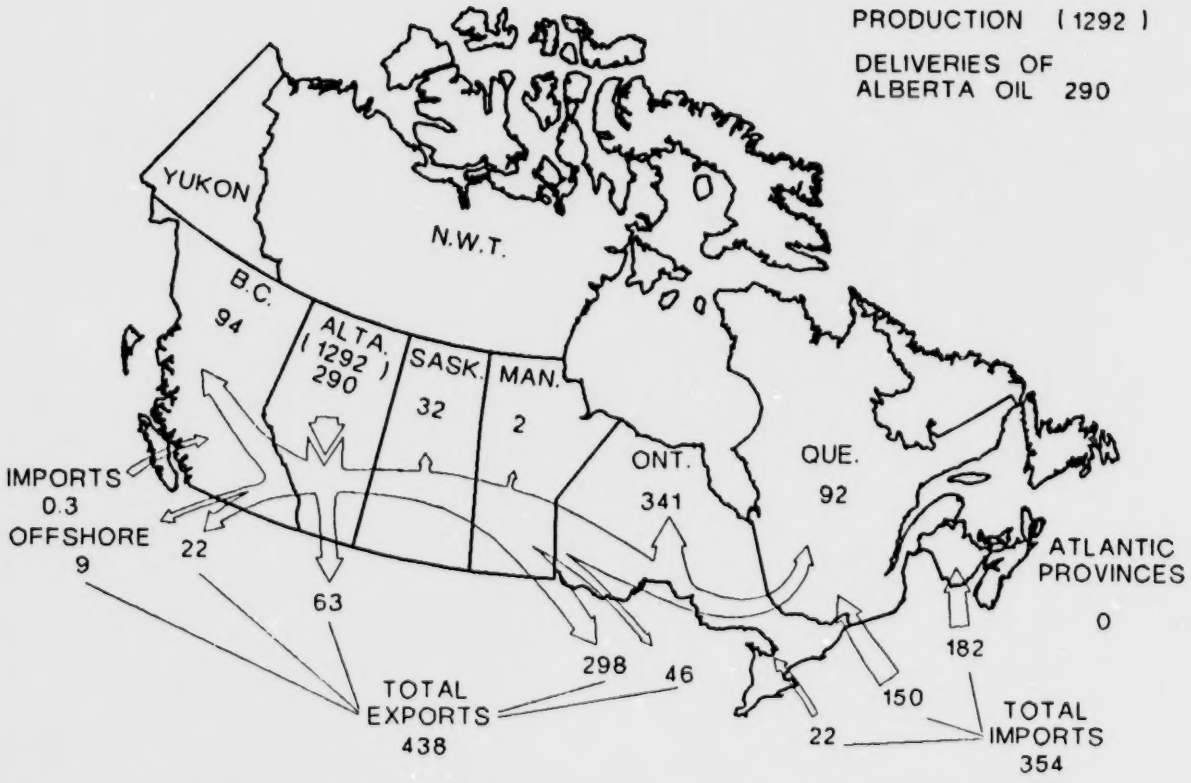

Fig. 11. MOVEMENTS OF CRUDE OIL AND EQUIVALENTS, 1986

(THOUSANDS OF BARRELS PER DAY)

7.4 BARRELS = 1 TONNE

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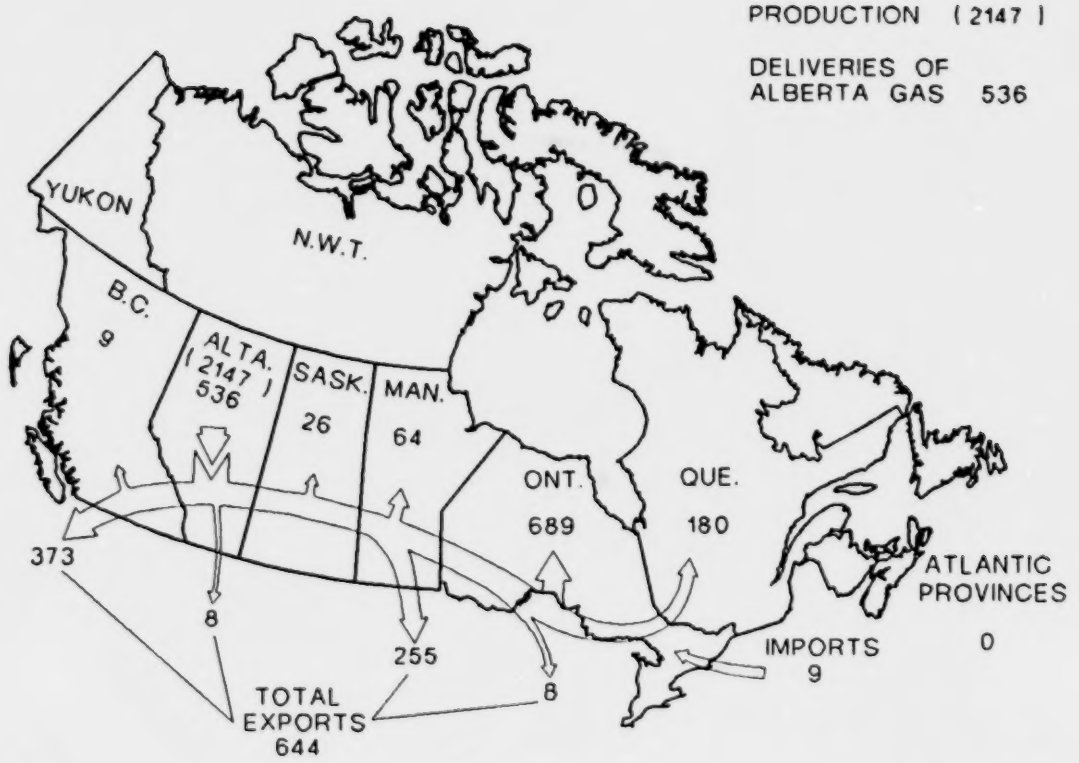

Fig. 12. MOVEMENTS OF NATURAL GAS, 1986

(BILLIONS OF CUBIC FEET)

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All projections which have been done of future Canadian energy supply and demand have one thing in common; they assume depleting Alberta conventional oil reserves will be essentially replaced by the increased production of oil from Alberta's oil sands (Figure 13).

These huge deposits (Figure 14) contain one trillion barrels of bitumen-in-place. Ten per cent of the bitumen in the deposits is amenable to surface mining (Figures 15 and 16). The remaining 90 per cent may be recovered only by subsurface methods involving the application of heat in some form (Figure 17) and typically employing inclined and horizontal drilling, and even drilling upwards from a mine tunnel beneath the deposit (Figure 18).

Recovery factors for the surface mines are high (92 per cent) and active research, much of which is sponsored by the Alberta Oil Sands Technology and Research Authority, is resulting in increased recovery factors for subsurface methods, now in the 17 to 20 per cent range for existing commercial projects. The cost of producing any oil sands is high. Substantial efforts have therefore been made by the Alberta government to encourage production from the companies holding oil sands leases, notably by the provision of a royalty payment on production which exceeds a minimal rate only after costs have been recovered from revenues. Only so much can be done by Alberta itself, however, and the rest of Canada will also have to provide support in some form.

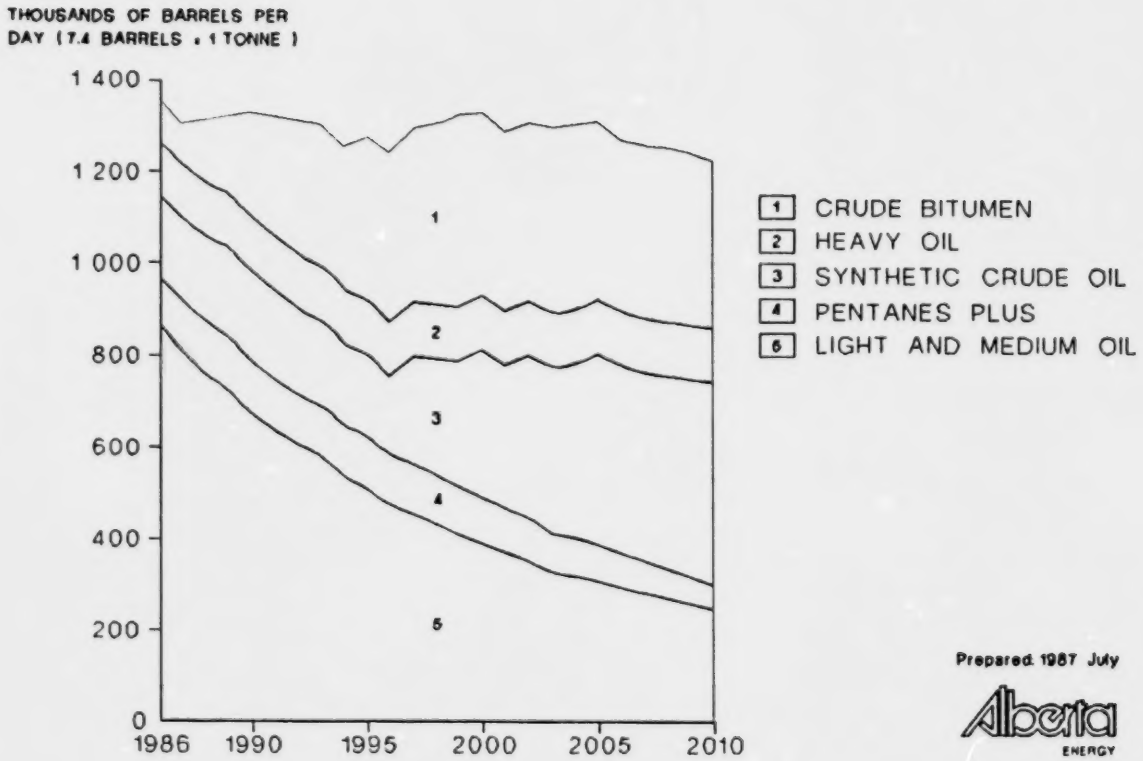

Fig. 13. PROJECTED SOURCE OF ALBERTA OIL & EQUIVALENT

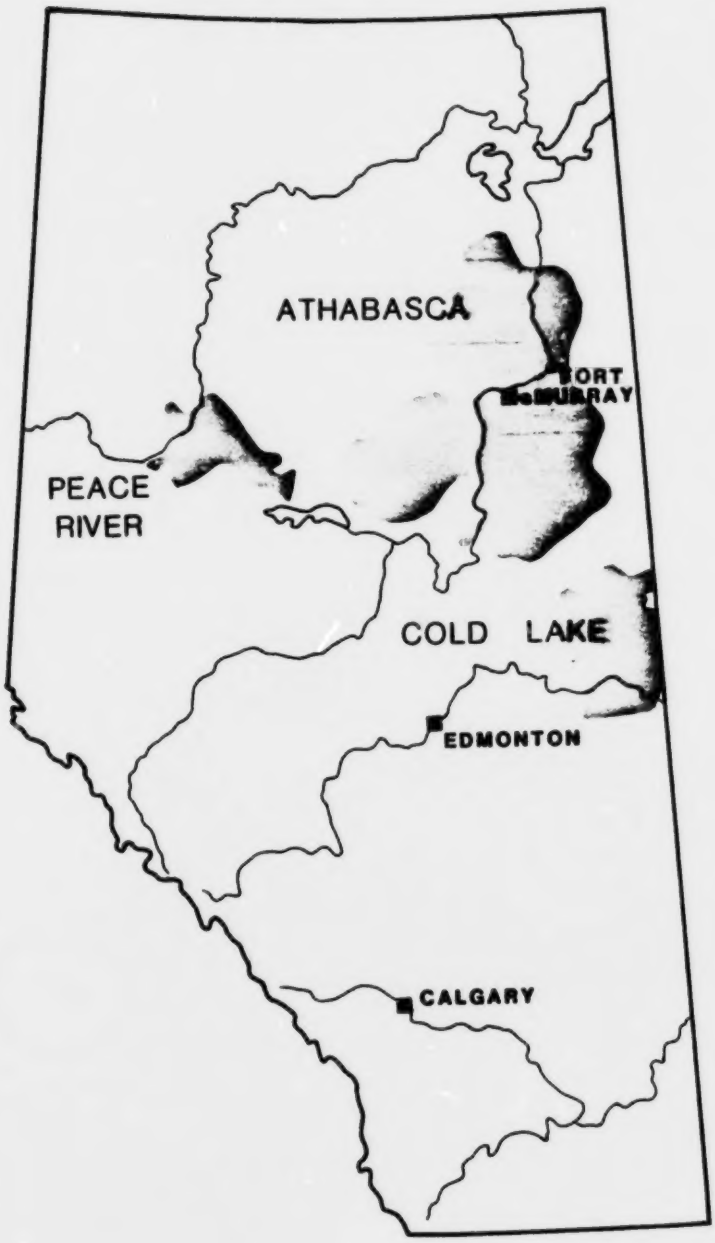

Fig. 14. OIL SANDS DEPOSITS

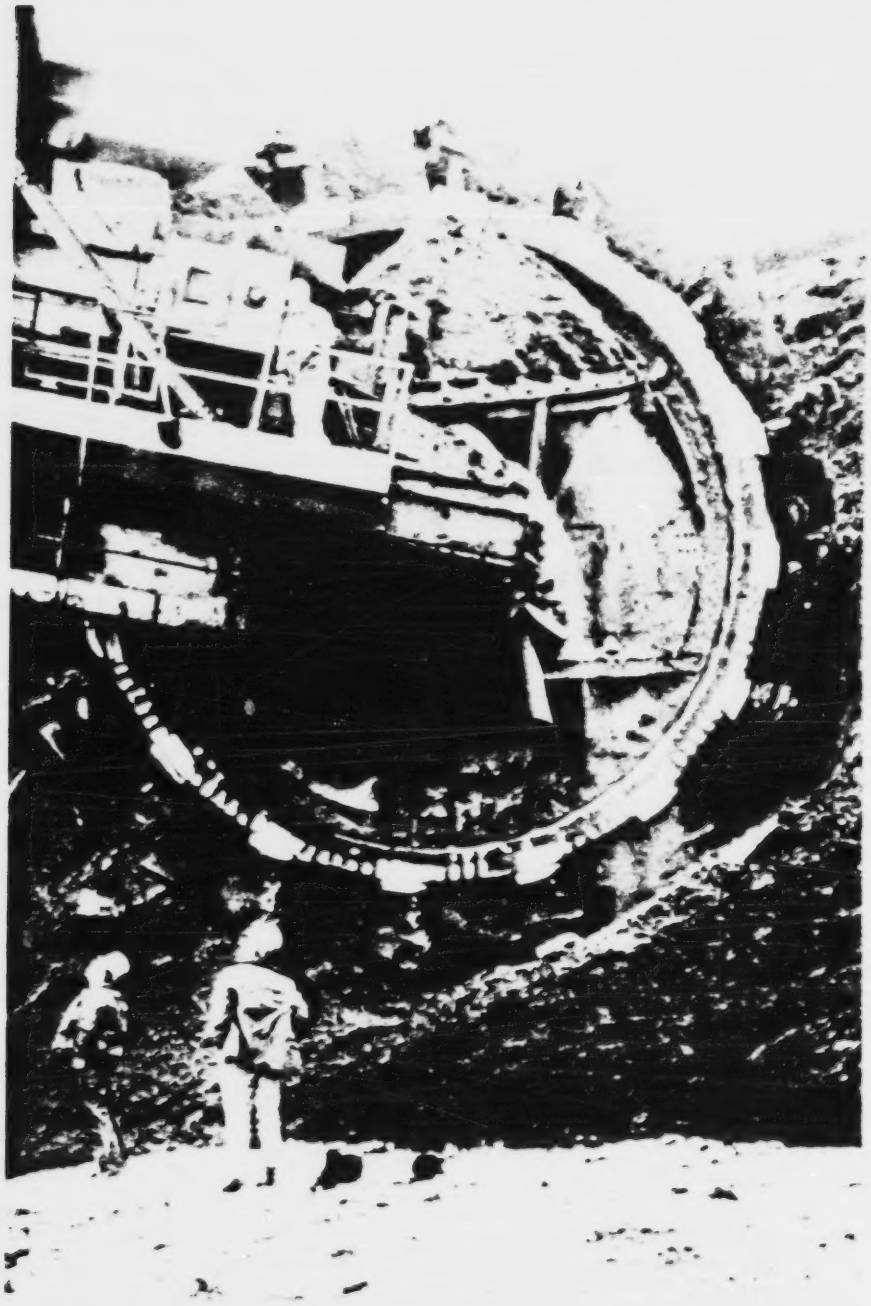

Fig. 15. BUCKETWHEEL EXCAVATOR

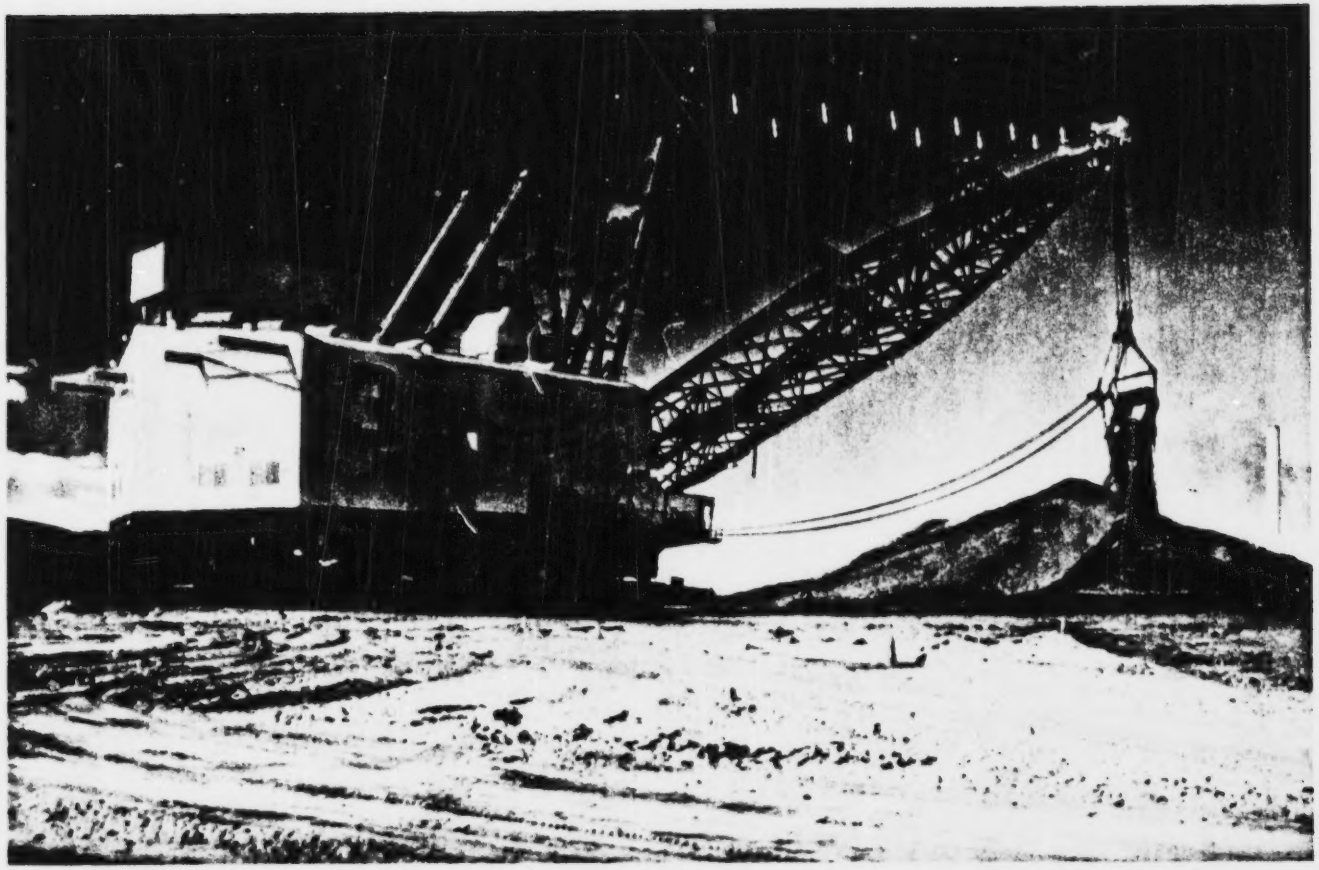

Fig.16. DRAGLINE

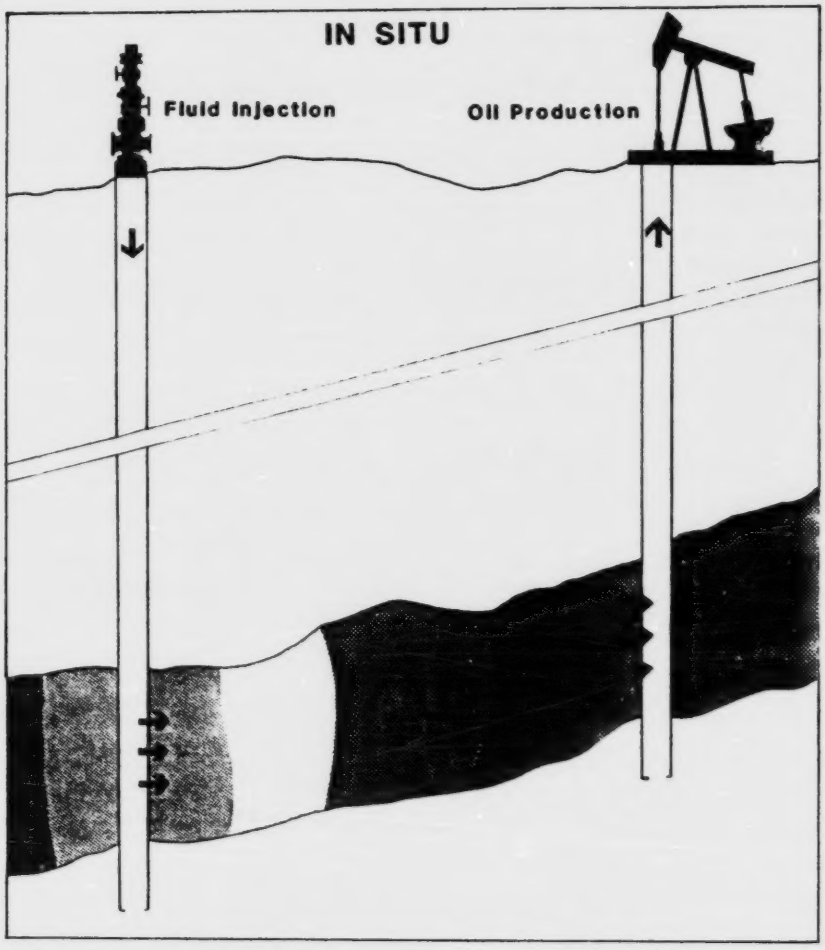

Fig.17 **IN SITU RECOVERY**

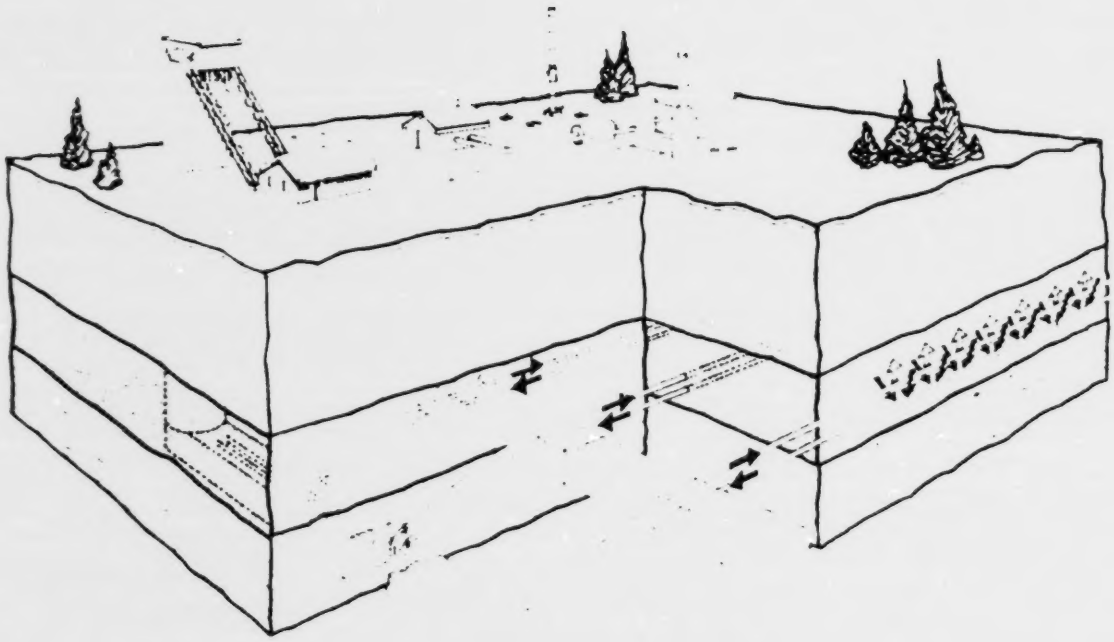

Fig.18. UNDERGROUND TEST FACILITY

3. PUBLIC OWNERSHIP AND PRIVATE DEVELOPMENT; THE POTENTIAL FOR DIFFERING PRIORITIES

Although overwhelmingly publicly owned, Alberta's petroleum resources have always been privately developed. This distinction was not so much the result of a conscious decision by government as a long-standing recognition that government's role is to provide a business climate within which private individuals and companies will apply their skills and risk their money in anticipation of a profit.

People vary widely in their perceptions of geological, economic and political risk and different sizes and types of oil and gas prospects differ in attractiveness to various companies. Because of this, Alberta petroleum legislation is specifically designed to attract investors of every size, the greatest numbers of which (if one discounts individual service station owner-operators) are in the upstream (exploration and development) end of the business. The government of Alberta has sufficient controls on the exploration and development of its resources that it has never concerned itself about the source of the necessary capital. Foreign investment has always been welcomed. Major foreign petroleum companies are now overwhelmingly staffed by Canadians, Albertans in the upstream end. Many of these Albertans have gone on to form independent Canadian companies, some of which have acquired world-wide stature in all phases of the petroleum business.

Alberta has more stratigraphic than structural hydrocarbon traps. As one would deduce from this southwest-northeast cross section of the western Canada sedimentary basin (Figure 19), the pools now

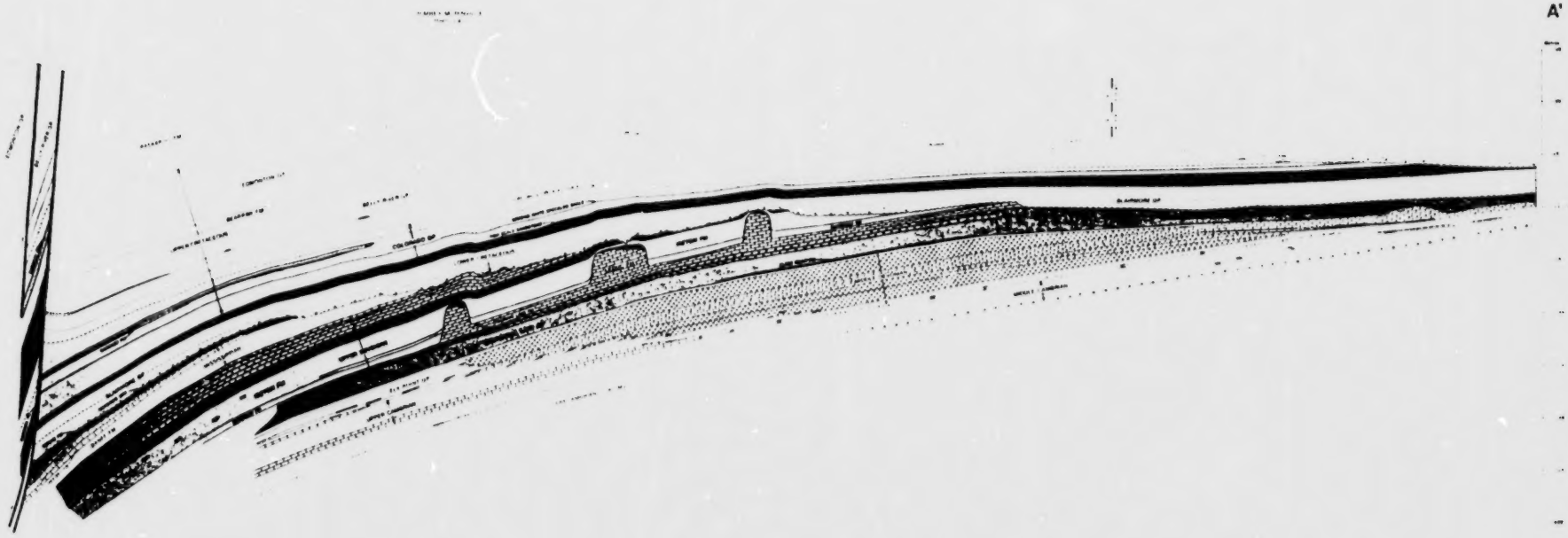

Fig. 19. CROSS-SECTION A-A'

being discovered are mostly small (Figure 20) and, while it has occasionally been suggested that it is extravagant, even wasteful, of human resources to have so many people looking for petroleum in the same area the Alberta belief is that an environment in which many individual convictions can be given an opportunity to succeed will lead to the discovery of more oil and gas than if those people worked for one large organization.

While private companies overwhelmingly urge the lowest possible level of involvement by government in the marketplace, which they variously term "intrusion", "interference", etc., it has to be recognized that legitimate government priorities exist which necessitate the establishment of policies which may not always coincide with those of the companies.

In regard to oil sands development, for example, many - perhaps most - potential developers believe the government of Alberta and the federal government should either offer further direct financial incentives or, alternatively, wait until world oil prices rise sufficiently that under the current royalty and tax regime oil sands surface mining, subsurface recovery and bitumen upgrading projects will become sufficiently attractive to warrant their construction and operation. They suggest this second alternative even as they must know that a period of domestic supply shortage could thereby be followed by a rush to build oil sands plants, a rush which could not easily be met by available capital, workforce and facilities. In short, there is every possibility the government(s) priorities will differ from those in the private sector who hold the oil sands leases. Fortunately for the government of Alberta, each lease, and the legislation under which it exists, contains a clause under which the Minister may require a plant to be constructed and operated. Failure by the lessee to meet this requirement would result in cancellation of the lease. The rights could then be made available to another company and it would be made a specific condition of the new lease that development proceed forthwith.

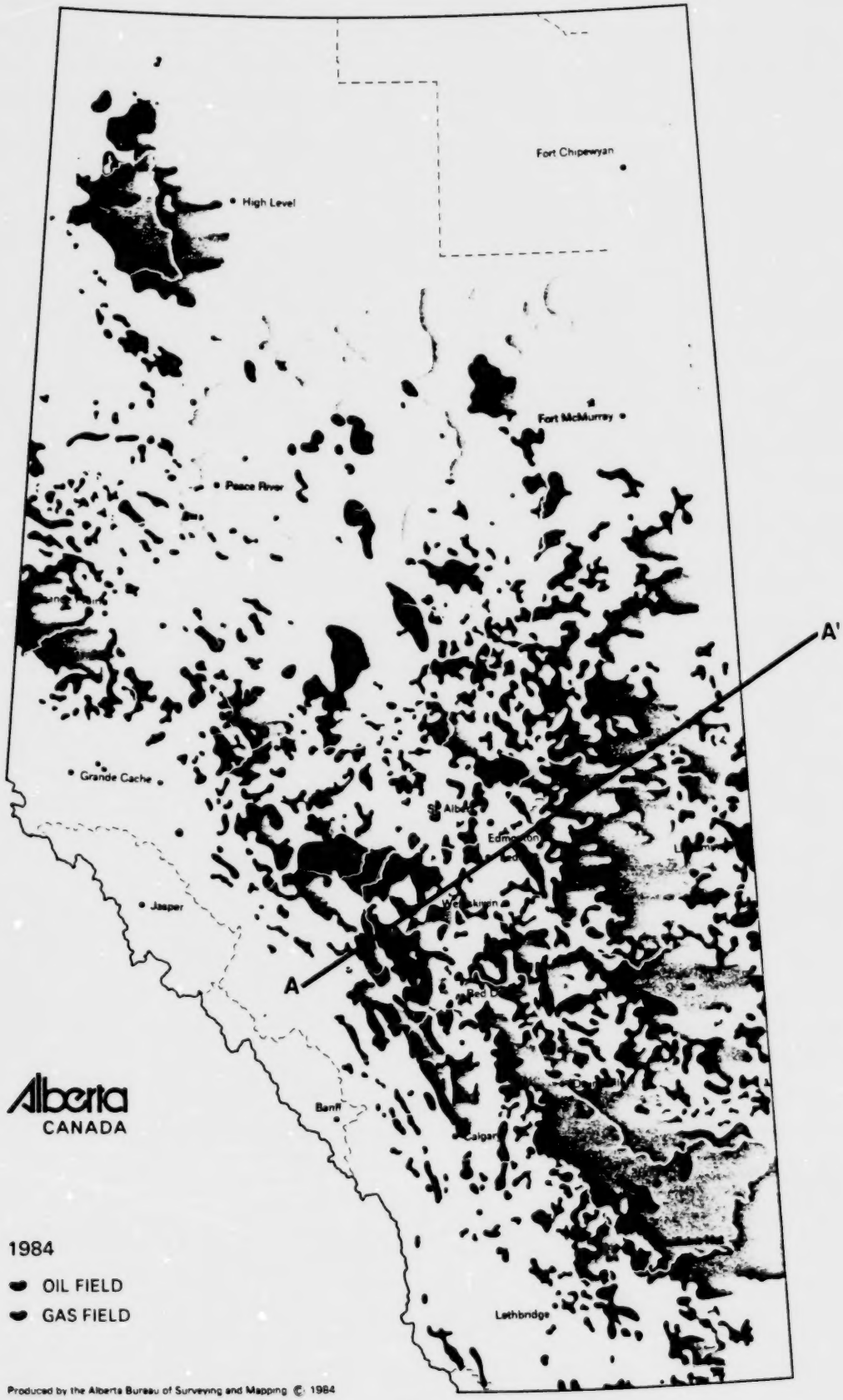
Fort Chipewyan
High Level
Fort McMurray
Peace River
A
A'
Grande Cache
Jasper
Banff
Calgary
Lethbridge
Alberta
CANADA
1984
OIL FIELD
GAS FIELD
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Fig. 20.

To this date, the government has never chosen to serve a production start-up notice, preferring to negotiate acceptable financial arrangements, but such action should not be ruled out for the future.

4. INTERACTION OF GOVERNMENTS AND THE PRIVATE SECTOR

Because petroleum industry development relies on the extensive national and international movement of money and goods, the relationship between the federal government, the provincial governments and the private sector is of critical importance. Although "relationship" is used in the singular in the title of this paper, as referring to the overall framework within which parties relate to one another, there are a multitude of individual relationships involved.

These relationships are too complex to be adequately portrayed two-dimensionally. The figures which follow are therefore purely schematic and, of necessity, greatly over-simplified.

From Alberta's point of view, however, we can identify three major groups of players from which these relationships flow, comprising (Figure 21);

- governments,
- "The Oil Patch," as it is known, ranging from large trans-national, integrated energy companies to the owner of a single oil equipment welding truck, and
- local, national and international sources of funding.

The importance of intergovernmental relationships (Figure 22) has been referred to earlier.

From time to time it is apparent that while the overall objective of government policy is to encourage development of the

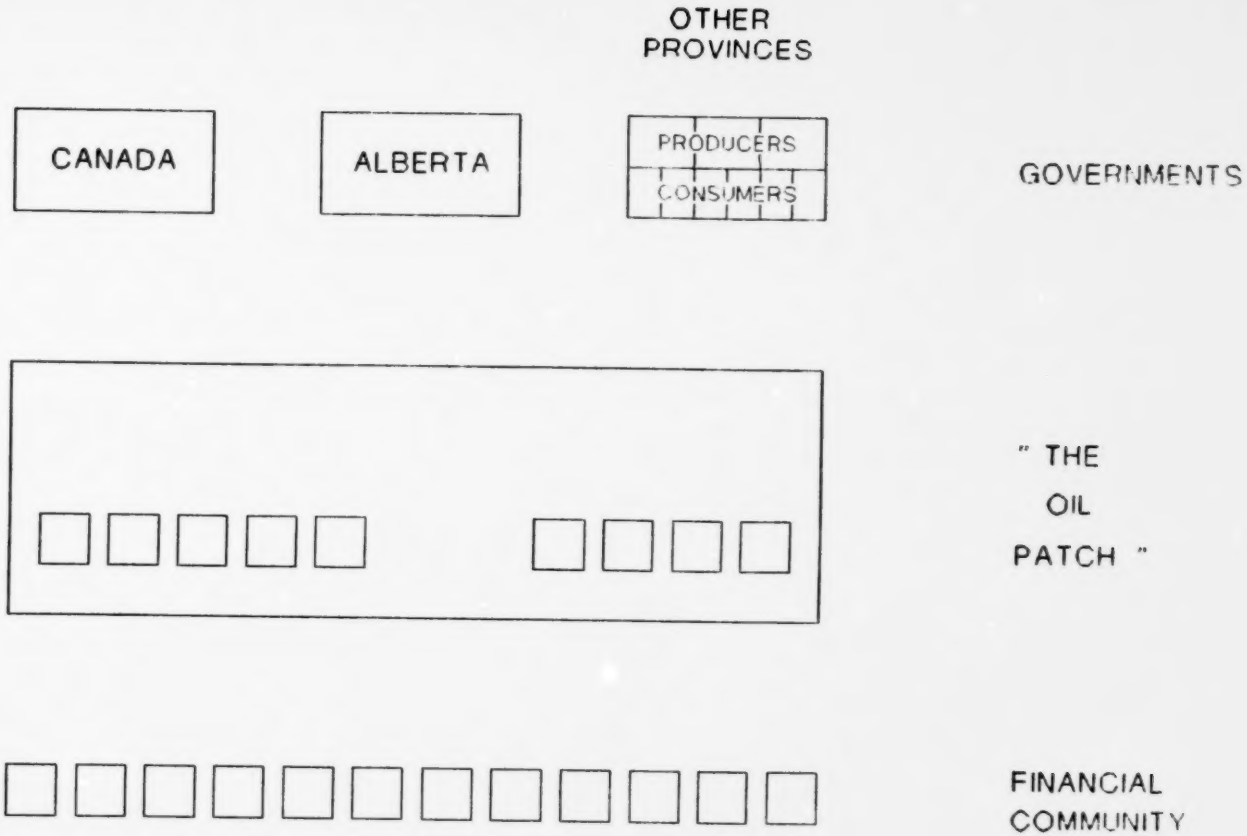

Fig. 21. THE THREE MAJOR GROUPS OF PLAYERS

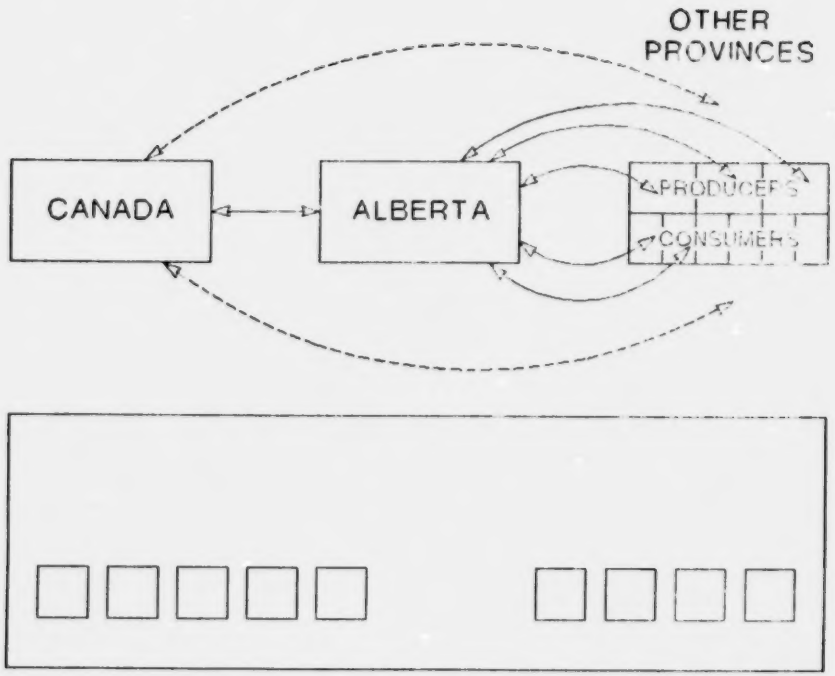

Fig 22. INTER-GOVERNMENTAL

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petroleum industry by the private sector in the public interest, priorities and interests within the private sector vary widely. While the approximately two thousand companies who hold oil and gas agreements (Figure 23) deal with the Department of Energy on an individual basis (Figure 24), as do contractors (Figures 25 and 26), the oil- and gas-related industry associations provide a convenient and rapid way of obtaining private sector reaction and input to government policy.

The Department deals with the following industry associations (Figure 27):

·CPA - Canadian Petroleum Association (120 Members)

Comprises mostly the trans-national major companies. Some are wholly integrated within Canada (exploration, development, production, gas processing, oil refining, refining, marketing); others are involved only in exploration, development and production stages. These companies produce some 90 per cent of Canada's oil and more than 70 per cent of the nation's natural gas.

·IPAC - Independent Petroleum Association of Canada (362 Members)

Represents the companies varying in size from the smaller one- or two-person organization to sizable companies exploring for oil and gas on an international level. The independent usually sells his oil to refineries, who then market the refined products and its natural gas to pipelines or utility companies, who in turn sell it to the ultimate consumers. The vast majority of independent companies are Canadian-owned. In terms of activity in Canada, in 1985 the IPAC-member companies initiated over 50 per cent of all wells drilled.

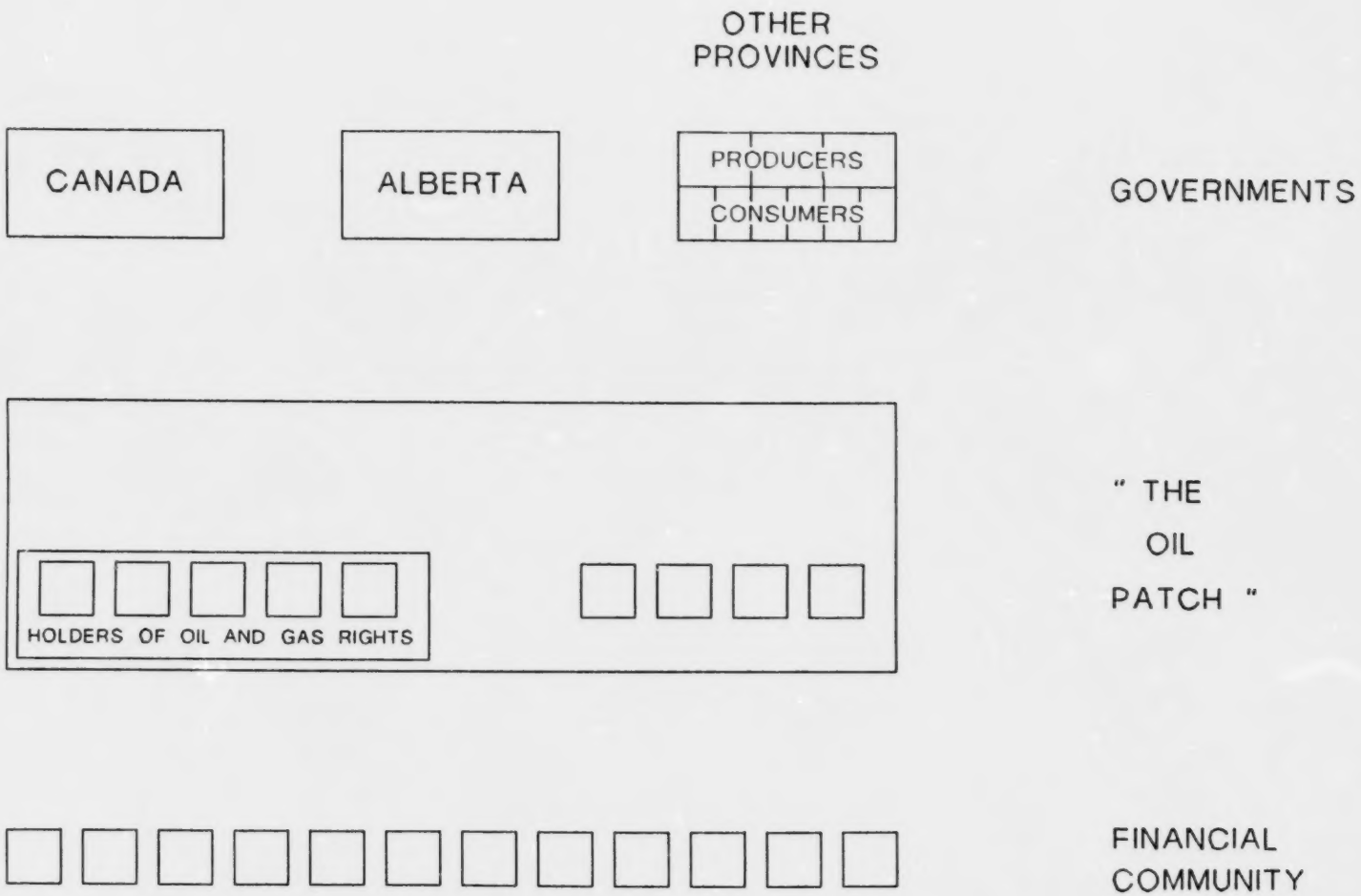

Fig. 23. HOLDERS OF OIL AND GAS RIGHTS

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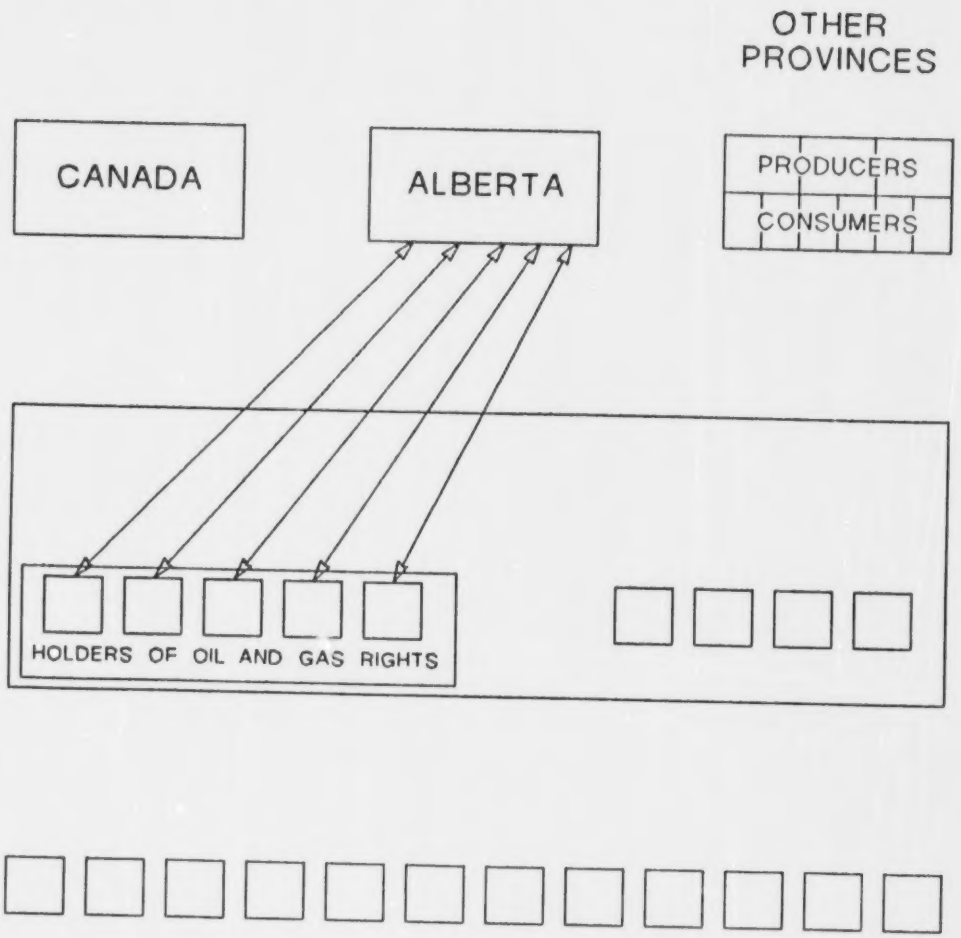

Fig. 24. LESSOR / LESSEE

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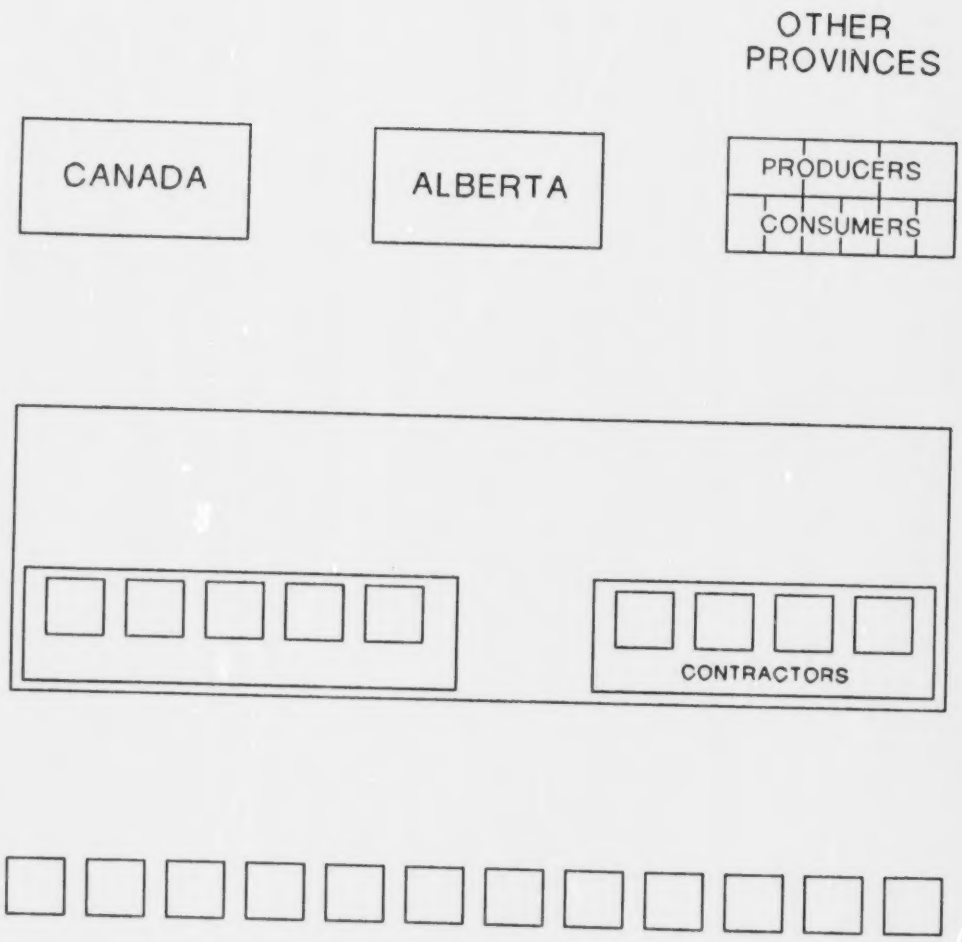

Fig. 25. CONTRACTORS

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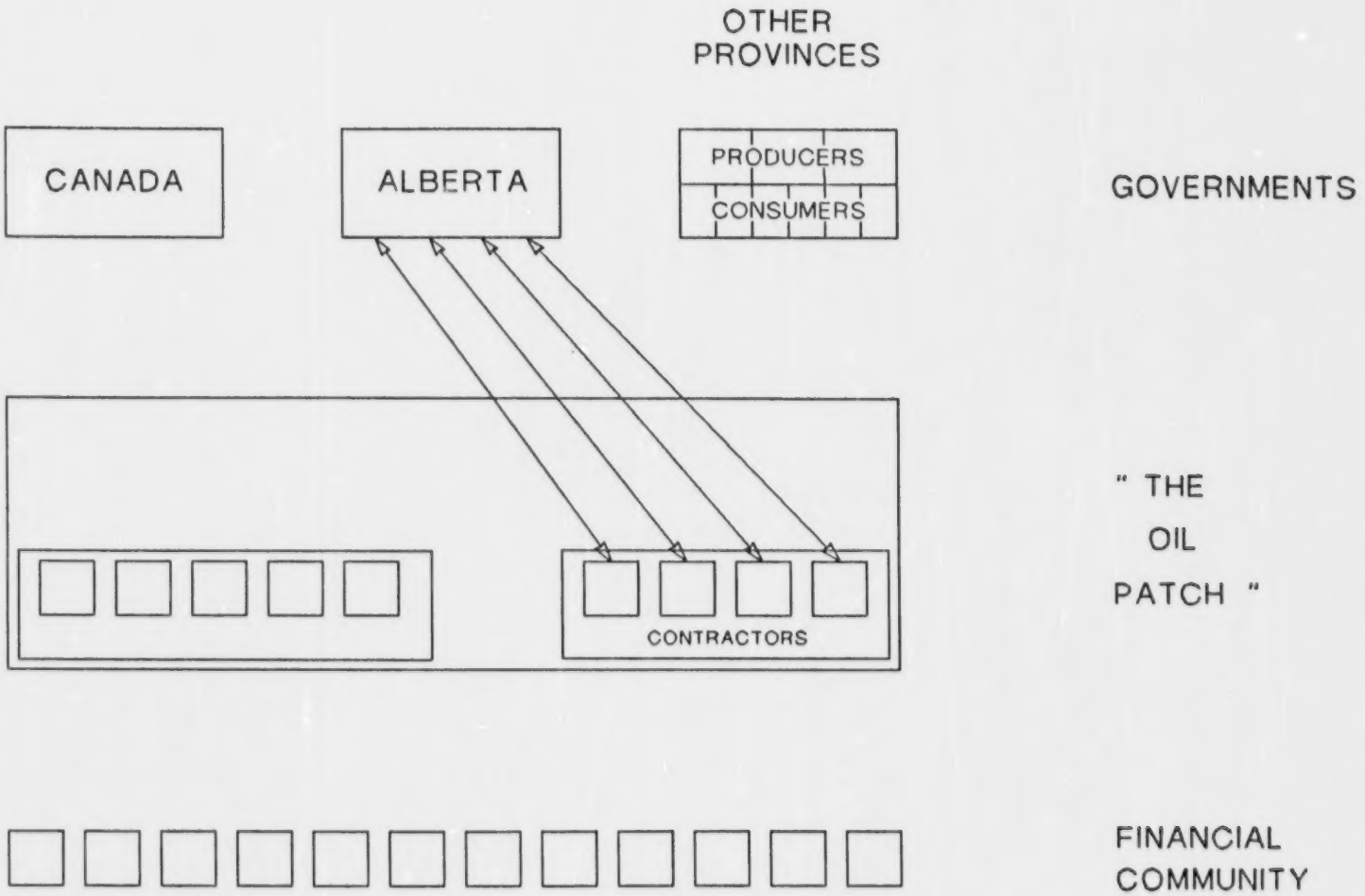

Fig. 26. CONTRACTOR / REGULATOR

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	NAME	MEMBERSHIP	DESCRIPTION
CPA	CANADIAN PETROLEUM ASSOCIATION	120	MOSTLY TRANS - NATIONAL MAJOR COMPANIES, SOME FULLY INTEGRATED IN CANADA
IPAC	INDEPENDENT PETROLEUM ASSOCIATION OF CANADA	362	VERY SMALL TO SIZABLE EXPLORATION AND DEVELOPMENT COMPANIES
SEPAC	SMALL EXPLORERS AND PRODUCERS ASSOCIATION OF CANADA	228	VERY SMALL COMPANIES (ONE TO THREE EMPLOYEES)
ACR	ALBERTA CHAMBER OF RESOURCES	200	PRODUCERS, AND SUPPLIERS TO INDUSTRIAL DEVELOPERS
CAGC	CANADIAN ASSOCIATION OF GEOPHYSICAL CONTRACTORS	199	COMPANIES ENGAGED IN MOSTLY SEISMIC CONTRACT WORK
CAODC	CANADIAN ASSOCIATION OF OILWELL DRILLING CONTRACTORS	231	DRILLING AND SERVICE RIG CONTRACTORS
PSAC	PETROLEUM SERVICES ASSOCIATION OF CANADA	281	OILFIELD SERVICE, SUPPLY AND MANUFACTURING COMPANIES

Fig. 27. INDUSTRY ASSOCIATIONS, 1987

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•SEPAC - Small Explorers and Producers Association of Canada (228 Members)

Represents the very small companies (one to three employees) not currently members of IPAC. This is the newest association with which our Department interacts.

•CAODC - Canadian Association of Oilwell Drilling Contractors (231 Members)

Represents substantially all of the drilling and service rig contractors operating in Canada.

•CAGC - Canadian Association of Geophysical Contractors (199 Members)

Represents companies engaged in geophysical contract work done on behalf of the oil and gas exploration companies.

•PSAC - Petroleum Services Association of Canada (281 Members)

Represents the oilfield service, supply and manufacturing companies.

•ACR - Alberta Chamber of Resources (200 Members)

Membership is broad-based and is made up of producers and suppliers to the industrial developers in the province.

The associations collectively represent their members' interests only on policy issues (Figure 28); the Department always deals with individual companies on matters relating to that company's specific operations. The associations deal with other governments, as the issue warrants (Figure 29) and the financial community deals primarily with individual companies (Figure 30), on specific matters but also with governments.

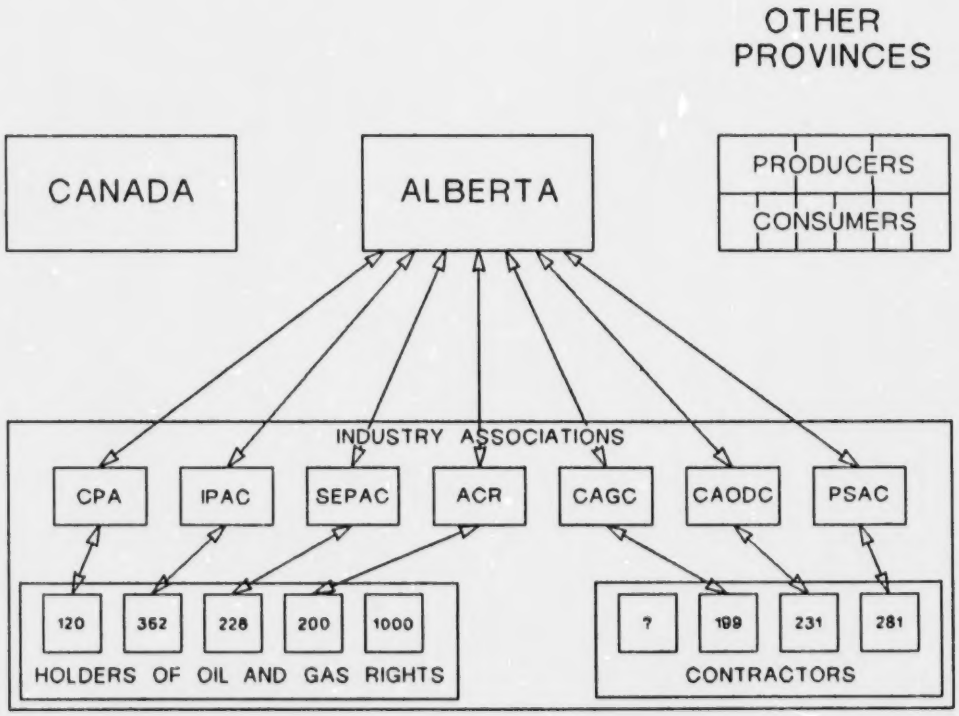

Fig. 28. ALBERTA / INDUSTRY ASSOCIATIONS

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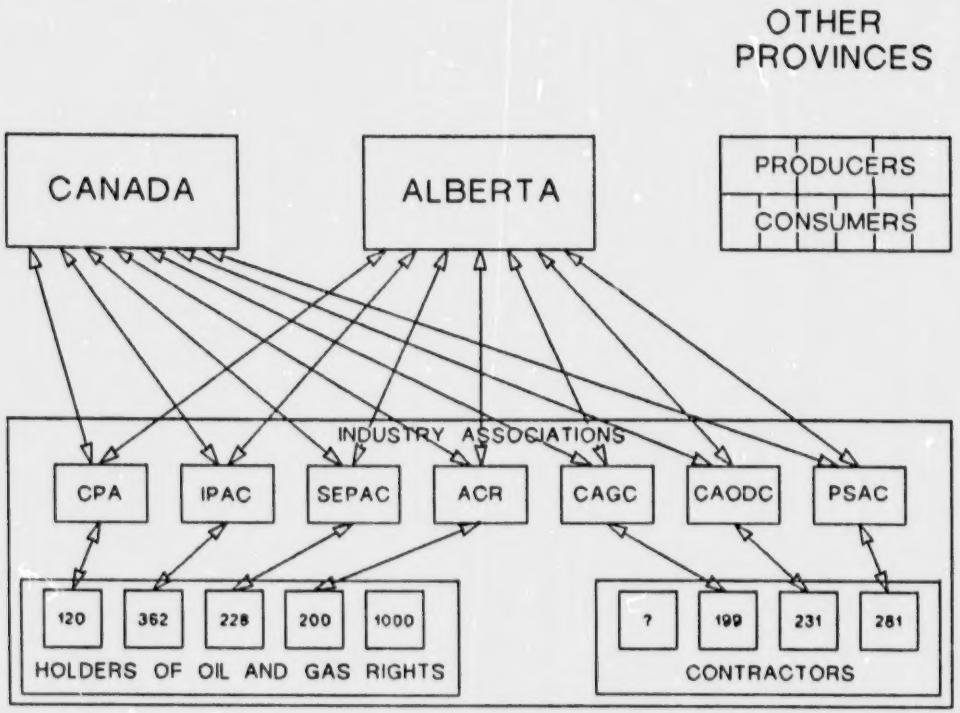


GOVERNMENTS

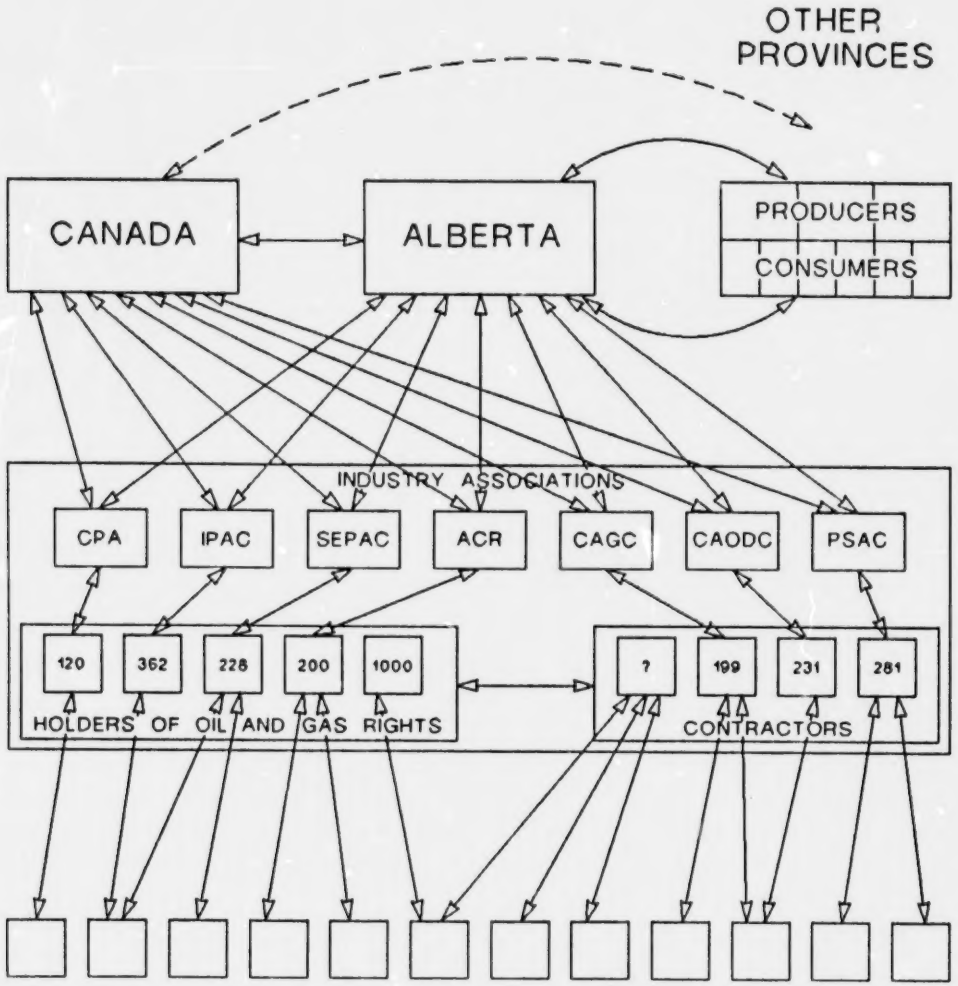
" THE OIL PATCH "

FINANCIAL COMMUNITY

Fig. 29. GOVERNMENTS / INDUSTRY ASSOCIATIONS

Prepared: 1987 July

Alberta ENERGY



GOVERNMENTS

" THE OIL PATCH "

FINANCIAL COMMUNITY

Fig. 30. SUMMARY

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Alberta ENERGY

In addition, the Department meets with the following professional associations (Figure 31):

- APEGGA - Association of Professional Engineers, Geologists and Geophysicists of Alberta (24,276 Members)

  Note: The practice of engineering, geology and geophysics is reserved to persons who are "registered" members or licensees of APEGGA and to companies which have a "permit to practice" or a "certificate" issued by APEGGA.

- CSEG - Canadian Society of Exploration Geophysicists (1,700 Members)

  Represents individuals and companies active in the geophysical industry.

- CAPL - Canadian Association of Petroleum Landmen (1,150 Members)

  Represents that segment of industry responsible for negotiating surface and mineral agreements on behalf of the oil and gas exploration companies.

- CAPPA - Canadian Association of Petroleum Production Accountants (375 Members)

  Membership is primarily at the working level of production accountants.

- PASWC - Petroleum Accountants Society of Western Canada (350 Members)

  Membership is at the management level of production accountants who are involved with production, revenue and marketing.

- IAEE - International Association of Energy Economists (2,000 Members)

  Founded in 1979 in response to the growing awareness of the importance of managing or at least understanding the supply of energy in the global and national economies.

- CIM - Canadian Institute of Mining and Metallurgy (13,000 Members)

  Represents mining and petroleum engineers, metallurgists, geologists and geophysicists.

	NAME	MEMBERSHIP	DESCRIPTION
APEGGA	ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS OF ALBERTA	24, 276	PROFESSIONAL ENGINEERS, GEOLOGISTS AND GEOPHYSICISTS
CSEG	CANADIAN SOCIETY OF EXPLORATION GEOPHYSICISTS	1,700	COMPANIES ACTIVE IN THE GEOPHYSICAL INDUSTRY
CAPL	CANADIAN ASSOCIATION OF PETROLEUM LANDMEN	1,150	RESPONSIBLE FOR NEGOTIATING SURFACE AND MINERAL AGREEMENTS ON BEHALF OF OIL AND GAS EXPLORATION COMPANIES
CAPPA	CANADIAN ASSOCIATION OF PETROLEUM PRODUCTION ACCOUNTANTS	375	WORKING LEVEL OF PRODUCTION ACCOUNTANTS
PASWC	PETROLEUM ACCOUNTANTS SOCIETY OF WESTERN CANADA	350	MANAGEMENT LEVEL OF PRODUCTION ACCOUNTANTS
IAEE	INTERNATIONAL ASSOCIATION OF ENERGY ECONOMISTS	2, 000	ECONOMISTS INVOLVED IN MANAGING ENERGY SUPPLIES
CIM	CANADIAN INSTITUTE OF MINING AND METALLURGY	13, 000	MINING ENGINEERS, METALLURGISTS, GEOLOGISTS AND GEOPHYSICISTS

Fig. 31. PROFESSIONAL ASSOCIATIONS

Prepared: 1987 July

Alberta ENERGY

5. GEOPHYSICAL EXPLORATION

Except where prohibited for environmental reasons, geophysical exploration may be performed throughout the province by any recognized individual or company, without the need for the explorer to hold an agreement to the oil and gas rights. This policy of open access greatly encourages highly competitive bidding for undisposed oil and gas rights.

Four hundred and seventy companies hold exploration licences under which they may cause geophysical work to be done (Figure 32), and 100 companies (60 of whom are also licence holders) hold exploration permits allowing them to operate geophysical (mostly reflection seismic) equipment in the field.

Many parts of Alberta are easily accessible for geophysical exploration only when the ground is frozen, typically from December to March, but seismic shot also varies greatly from year to year with the rise and fall of world oil prices (Figure 33). The operators of geophysical equipment are invariably the first component of the industry to suffer from a drop in world prices.

Early in basin development governments may require submission and subsequent public disclosure of all geophysical data but in Alberta these data are privately sold and submitted to the government (confidentially and where necessary) only in support of pool delineation (see page 56). Companies are, however, required to report the movement of crews which are inspected in the field for compliance with operating requirements. Government inspectors also maintain contact with local authorities and mediate disputes between crews and farmers.

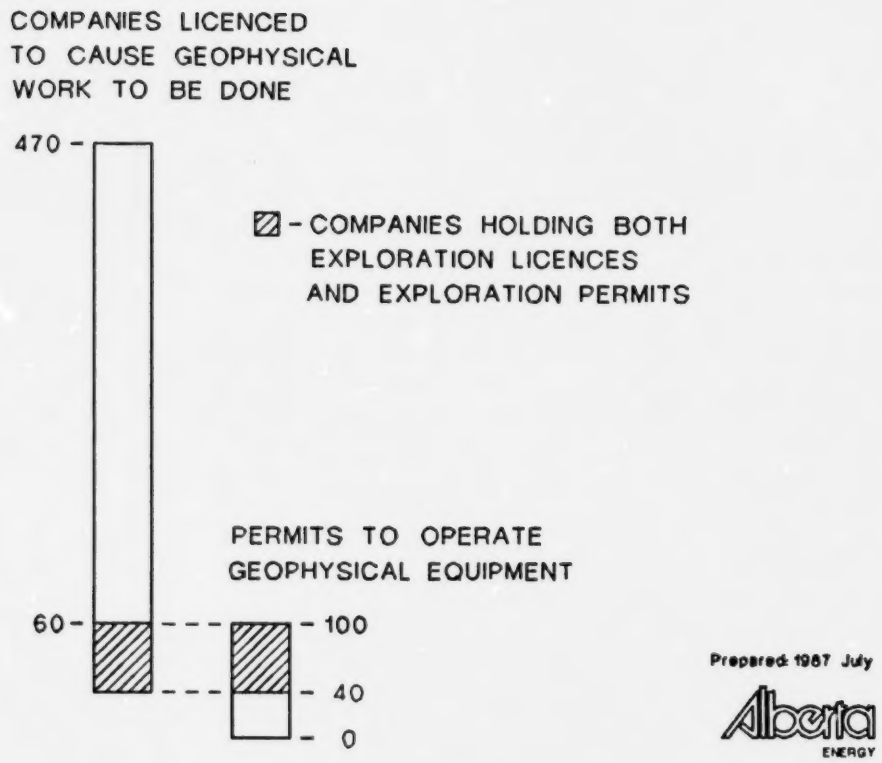

Fig. 32. EXPLORATION COMPANIES, GEOPHYSICAL OPERATORS

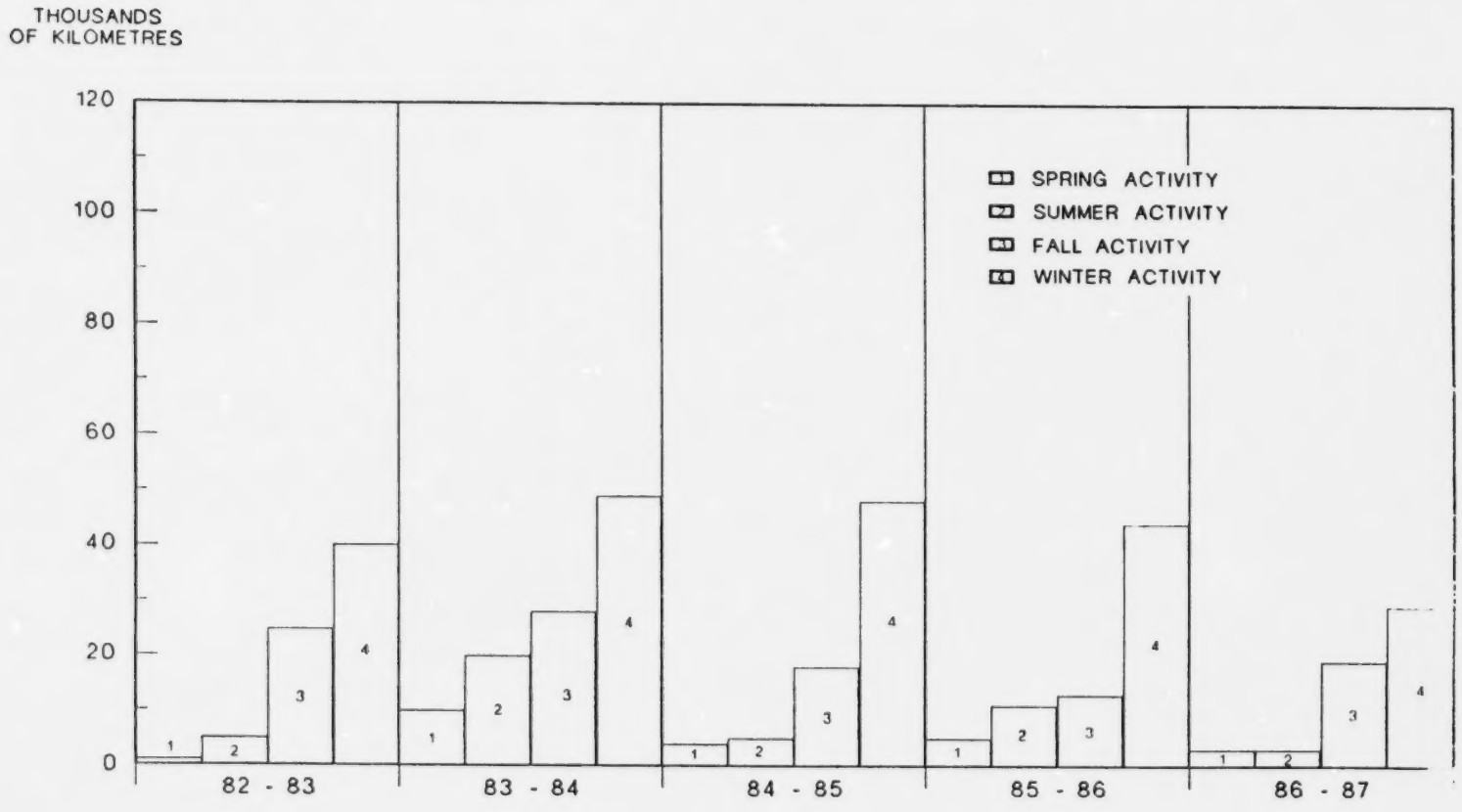

Fig. 33. GEOPHYSICAL EXPLORATION ACTIVITY

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6. ACQUISITION OF OIL AND GAS RIGHTS

Before exploratory drilling and development may take place, an energy company must hold an exclusive agreement to the oil and gas rights. At an early stage in the petroleum exploration and development of a country or sedimentary basin it is realistic and customary for a government to negotiate the terms and conditions for relatively few large concessions with relatively few companies. In all jurisdictions, however, provision should exist for unexplored and undeveloped oil and gas rights to revert to the state after the holder of those rights has held them for a reasonable period of time. This enables those rights to be made available to others.

The inevitable result of this recycling of rights through a succession of industry holders is that agreements conveying those rights become smaller in average area, but more numerous, with time (Figure 34).

In Alberta, prior to 1976, this reduction in area took place primarily by requiring holders of large exploration agreements (of 40,000 hectares maximum size, Figure 35) to surrender 50 per cent of the agreement area after completing an acceptable work program. The portions retained were not permitted to comprise blocks measuring more than 3 by 3 miles or 4 by 2 miles, the lease blocks either cornering or separated by corridors 1 mile or more in width (Figure 36). Further, immediately a discovery was made on one of these agreements a lease block had to be selected around the discovery well. This approach ensured the agreement holder could not acquire within a single lease the rights to a pool larger than a 3 by 3 mile lease block (2,300 hectares). Rights not retained were re-sold by competitive bid (Figure 37).

ALBERTA OIL & GAS AGREEMENTS
Comparison of Average Area to Active Agreements
1959 - 1987

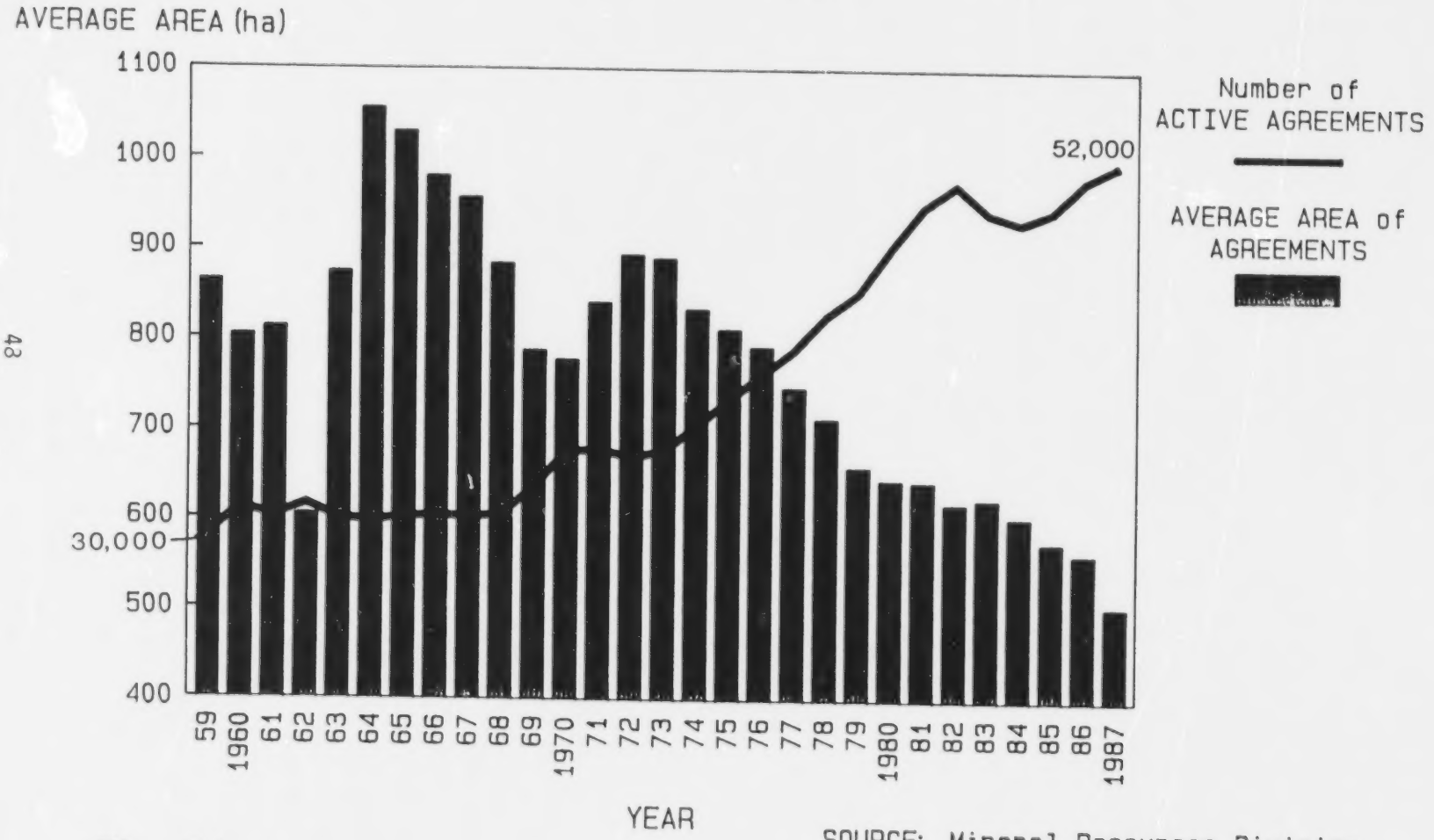

Fig. 34.

SOURCE: Mineral Resources Division
Prepared: 1987.07.23

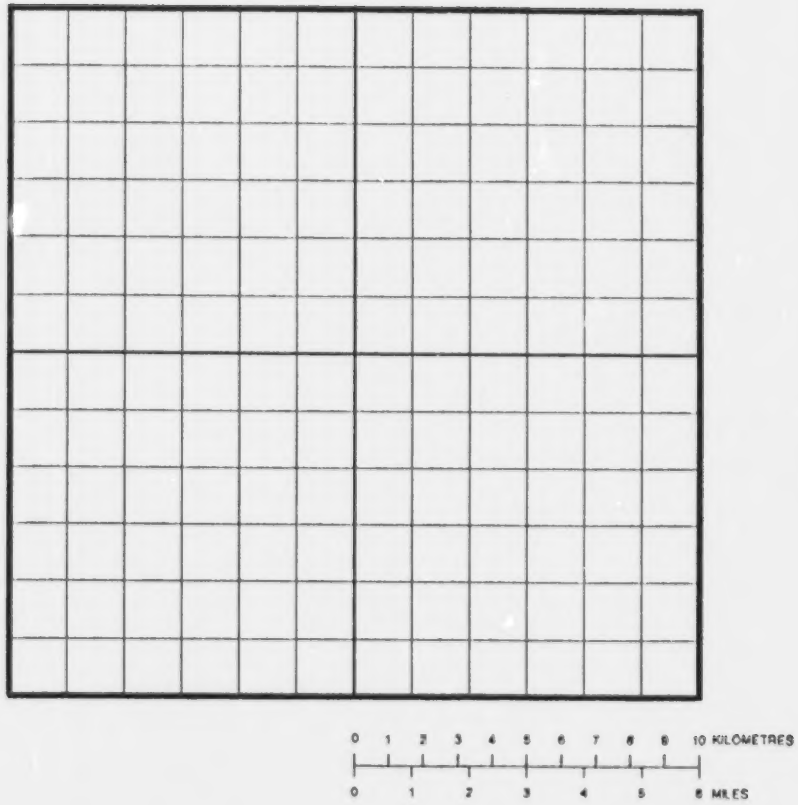

Fig. 35. PETROLEUM AND NATURAL GAS RESERVATION
(PRE - 1976)

Prepared: 1987 July

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ENERGY

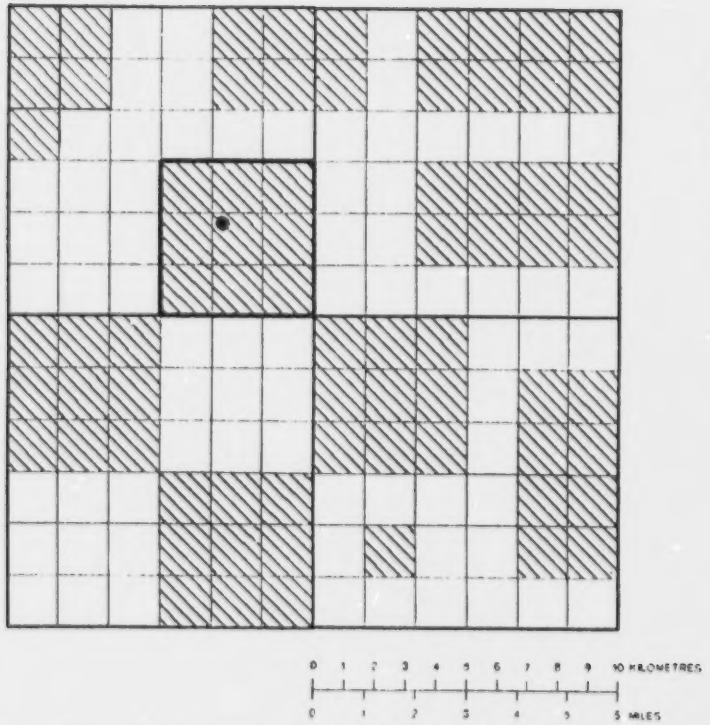

INITIAL LEASE SELECTED
SUBSEQUENT LEASES SELECTED
OIL DISCOVERY WELL
0 1 2 3 4 5 6 7 8 9 10 KILOMETRES
0 1 2 3 4 5 5 MILES
Alberta
ENERGY
Prepared 1987 July

Fig. 36. LEASE SELECTION FROM A PETROLEUM AND NATURAL GAS RESERVATION

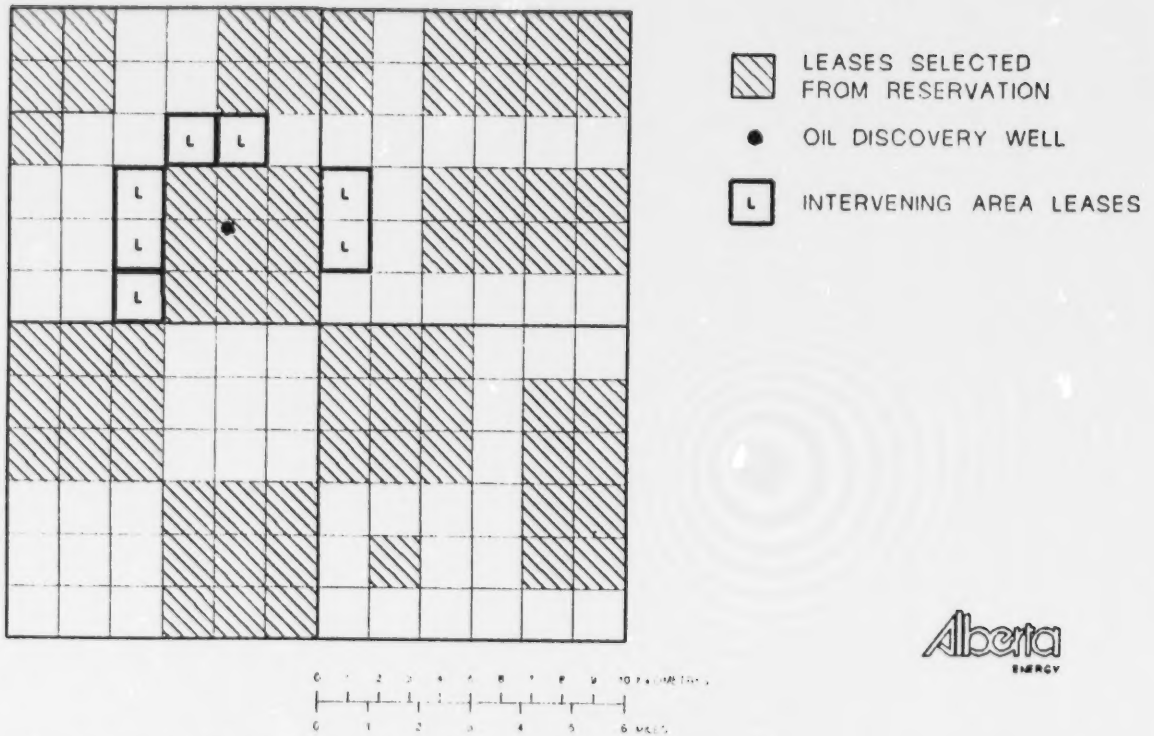


Fig. 37. LEASES OBTAINED IN INTERVENING AREAS

Prepared 1987 July

In 1976 it was decided that oil pools being discovered were generally smaller in area than a 3 by 3 mile lease block. Rather than reduce lease block maximum size, however, the decision was taken to reduce the maximum size of exploration agreements to 9,200 hectares, allowing the agreement to be converted totally to lease provided sufficient drilling was done (Figure 38), but to then ensure at the conclusion of the lease term the reversion to the Crown of all rights incapable of producing, including those below the production (Figure 39).

At the request of individual exploration and development companies, oil and gas rights are made available for acquisition through sealed competitive bidding and are awarded to the company which tenders the highest cash bonus. This bonus is non-refundable, and effectively allows the province to capture the economic rent which represents the difference between the bidder's anticipated revenues and costs, including his required rate-of-return.

The non-refundable competitive bonus system combines to work well for oil and gas agreements but for other minerals, specifically coal, metallic minerals and bitumen, royalty revenue to the province is payable at only a nominal level until project payout. Under such an arrangement a non-refundable bonus would merely defer payout; instead, for these minerals, the government's preference is to dispose of the rights by way of a competitively bid refundable work deposit.

Alberta now has close to 52,000 oil and gas agreements with the industry; they average approximately 500 hectares in size (Figure 40). They are made available to industry at the rate of 200 every two weeks and their terms and conditions are not negotiated, but are prescribed by legislation. They are held by approximately 2,000 companies, singly or jointly. In addition, numerous inter-company arrangements are made of which the government is often unaware and typically unconcerned.

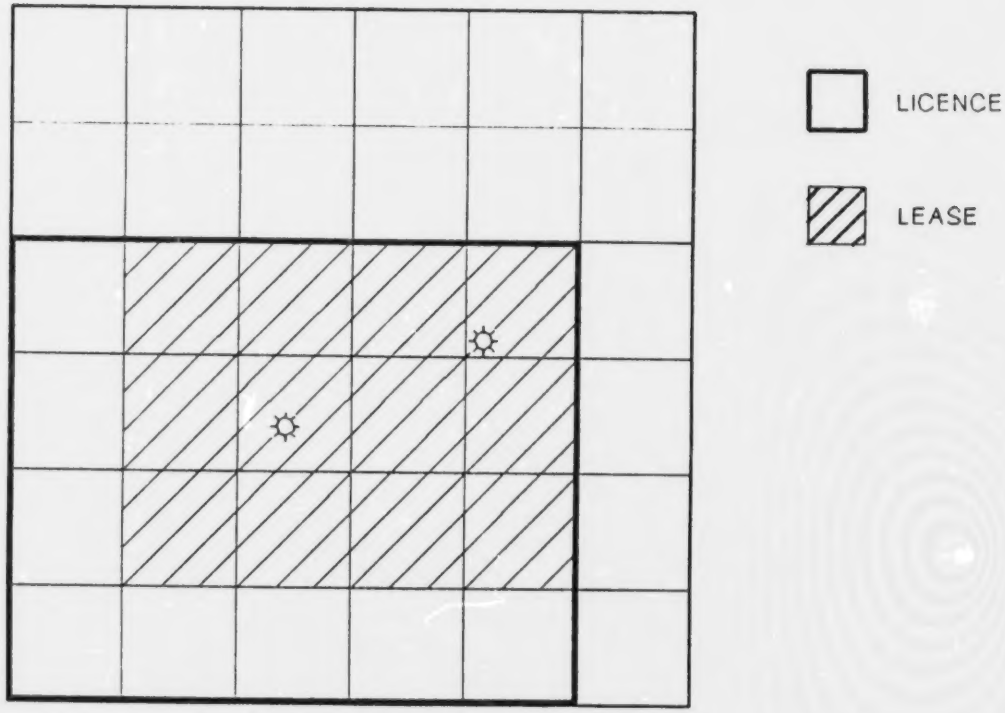
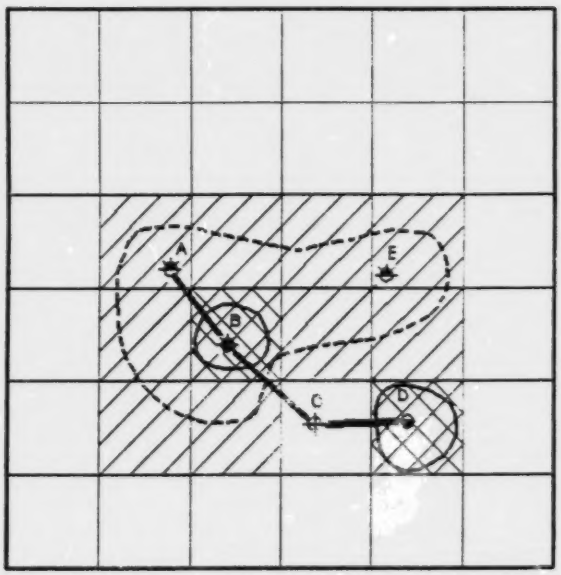
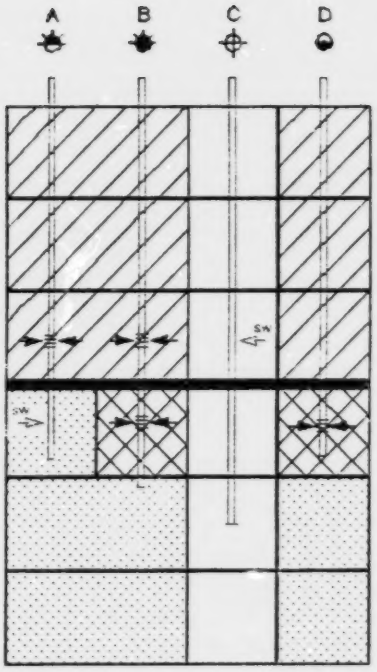


Fig. 38. LEASE SELECTION FROM A PETROLEUM AND NATURAL GAS LICENCE

Prepared: 1987 July

Alberta ENERGY





CROSS - SECTION OF LEASE

RIGHTS RETAINED

DEEPER RIGHTS REVERSION

LOWER CRETACEOUS GAS WELL

UPPER DEVONIAN OIL WELL

DUAL LOWER CRETACEOUS GAS / UPPER DEVONIAN OIL WELL

ABANDONED WELL

HYDROCARBON RECOVERY

SALT WATER RECOVERY

LOWER CRETACEOUS POOL

UPPER DEVONIAN POOL

Fig. 39. DEEPER RIGHTS REVERSION

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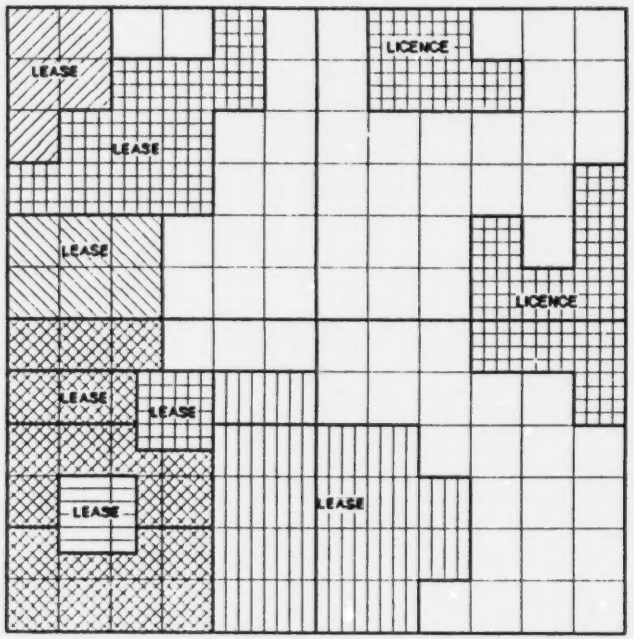


PETROREP (CANADA) LTD.
WINTERSHALL OIL OF CANADA LTD.
UNIVERSAL EXPLORATIONS LTD.
PEMBINA RESOURCES LIMITED
NORTHERN DEVELOPMENT CO. LTD
MIZEL OILS LTD.

MOBIL OIL CANADA, LTD.

RANGER OIL LIMITED
AMOCO CANADA PETROLEUM COMPANY LTD.

RANGER OIL LIMITED
MANY ISLANDS PIPE LINES (CANADA) LTD
AMOCO CANADA PETROLEUM COMPANY LTD.

PRECAMBRIAN SHIELD RESOURCES LIMITED

WESTCOAST PETROLEUM LTD.

Fig. 40. DIVERSITY OF AGREEMENT HOLDERS

Prepared 1987 July

Alberta

Two forms of oil and gas agreements are currently being granted. The petroleum and natural gas lease has a term of five years at the end of which, as mentioned above, the holder must demonstrate to the government the extent to which the lease is capable of production. Portions not capable of production revert to the province, both in regard to portions of the lease area which are incapable and in regard to strata below the deepest production demonstrated. Portions capable of production continue for so long as that capability can be demonstrated. Drilling is required only insofar as it is necessary to demonstrate capability of production and pool delineation. Further, for conventional oil or gas, there is no actual obligation to produce; Alberta relies on market forces to stimulate production, development drilling and the implementation of enhanced recovery schemes.

The petroleum and natural gas licence - also obtained by competitive cash bonus bidding - exists to afford the explorer an additional time period before which it is necessary to demonstrate productive capability. Depending on the ease of access to various parts of the province, licences may be obtained for terms of two, four or five years. At the conclusion of the term, the holder, dependent upon the extent to which he has drilled on the licence, has the exclusive right to acquire a lease to all or part of the licensed area, with no additional bonus payment.

Oil and gas agreements - whether producing or not - pay an annual rental to the province, typically of CAN $2.50 per hectare. Fees are also charged by the province for the various administrative functions associated with issuing and maintaining the agreements.

7. DRILLING AND PRODUCTION

Before a potential oil or gas well may be drilled the proponent must also obtain a well licence from the Alberta Energy Resources Conservation Board. This agency operates under provincial legislation and is funded by the private sector through a levy on operating wells, matched by an equal grant from the Alberta government.

The Board had its origin in the need to conserve natural gas which was being wastefully flared from one of Alberta's early oil fields. It is responsible for ensuring Alberta's energy resources are developed in a safe, orderly manner that avoids waste, controls pollution and is in the public interest.

In regulating the drilling of wells the Board is concerned primarily (Figure 41) with safety; conservation of the resource; protection of the environment; and the measurement and submission of drilling and production data:

- Safety includes ensuring drilling equipment and practices meet the highest standards.

- Conservation includes ensuring wells are separated by distances appropriate to the nature of the reservoir and the hydrocarbon being recovered, that wells are produced at rates not exceeding those which would damage the reservoir, and that all hydrocarbons in the reservoir are economically recovered.

ENERGY CONSERVATION BOARD RESPONSIBILITIES

- SAFETY
- CONSERVATION
- PROTECTION OF THE ENVIRONMENT
- SUBMISSION OF DRILLING AND PRODUCTION DATA

Fig. 41

Prepared: 1987 July

Alberta
ENERGY

- Protection of the Environment includes minimizing the impact of drilling and production upon water, agricultural, wildlife, other renewable resources and human lifestyles. To this end, public hearings are frequently held to which interested parties may make presentations.

- Submission of Drilling and Production data includes drill cores and cuttings, petrophysical logs, fluid, pressure and all production data. These data are used for the determination of reserves, reservoir life, maximum recovery rates, optimum well spacing and recovery methods. Data are forwarded to the Alberta Department of Energy for royalty calculation purposes and to facilitate the delineation of reservoirs for lease continuation. Cores, cuttings and other information from exploratory wells are held confidential for one year after which they are made available for inspection by any company, researcher or member of the general public. Information from other wells does not enjoy a period of confidentiality. This accessibility, to more than one thousand kilometres of core, seven and a half million vials of drill cuttings, together with other related information, is critical to encouraging competition within the private sector.

The Board publishes extensive data compilations and participates in supply/demand forecasting with a view to protecting future provincial needs. It also has the authority to impose measures to ensure equitable market access when supply exceeds demand. As with environmental issues, the Board frequently holds public hearings on these matters.

8. RESULTS OF EXPLORATION, DEVELOPMENT AND PRODUCTION

One hundred and ten thousand wells have been drilled in Alberta, approximately half of which are producing or capable of production. The most obvious trend in the number of wells drilled annually in Alberta since 1950 (Figure 42) is the increase which occurred in the mid-1970s when oil and gas prices rose. Prior to that time (Figure 43), exploratory wells were completed as oil wells and gas wells in approximately equal numbers, with dry holes totalling 65 to 80 per cent of all exploratory wells. Development wells drilled during the same period (Figure 44), at 1,200 per year, were roughly two and a half times as numerous. Completed overwhelmingly as oil wells (Figure 45), they reflect the far greater marketability of oil compared to gas at the time.

Since the mid-1970s, however, the susceptibility of drilling to world oil supply and pricing is evident, including the related demand for competing fuels, notably natural gas.

To reduce overall risk, companies typically attempt to locate their exploratory wells on more than one prospect. While gas and oil both occur in many reservoirs, however, southeastern Alberta is characterized by the abundance of shallow stratigraphic traps containing gas, and considerable exploratory effort was directed at them by some companies who envisaged expanding markets in the United States of America as an opportunity for an early return on their investment. The deepest portions of the sedimentary basin in Alberta are also gas-prone, but the companies exploring them were typically those interested in developing long-term supplies. The combination of their exploratory drilling efforts is evident in the rise in gas well completions (in percentage and absolute terms) from 1972 to 1983.

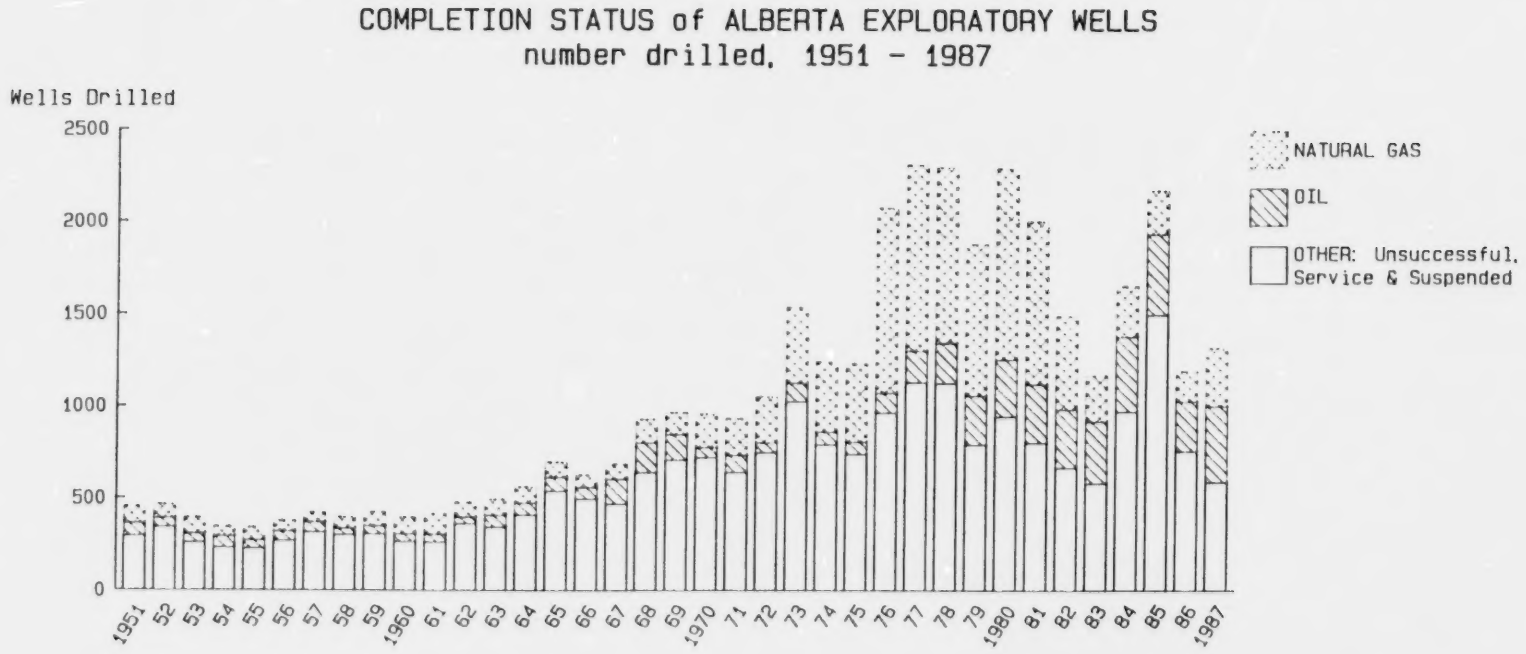


Fig. 42.

SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

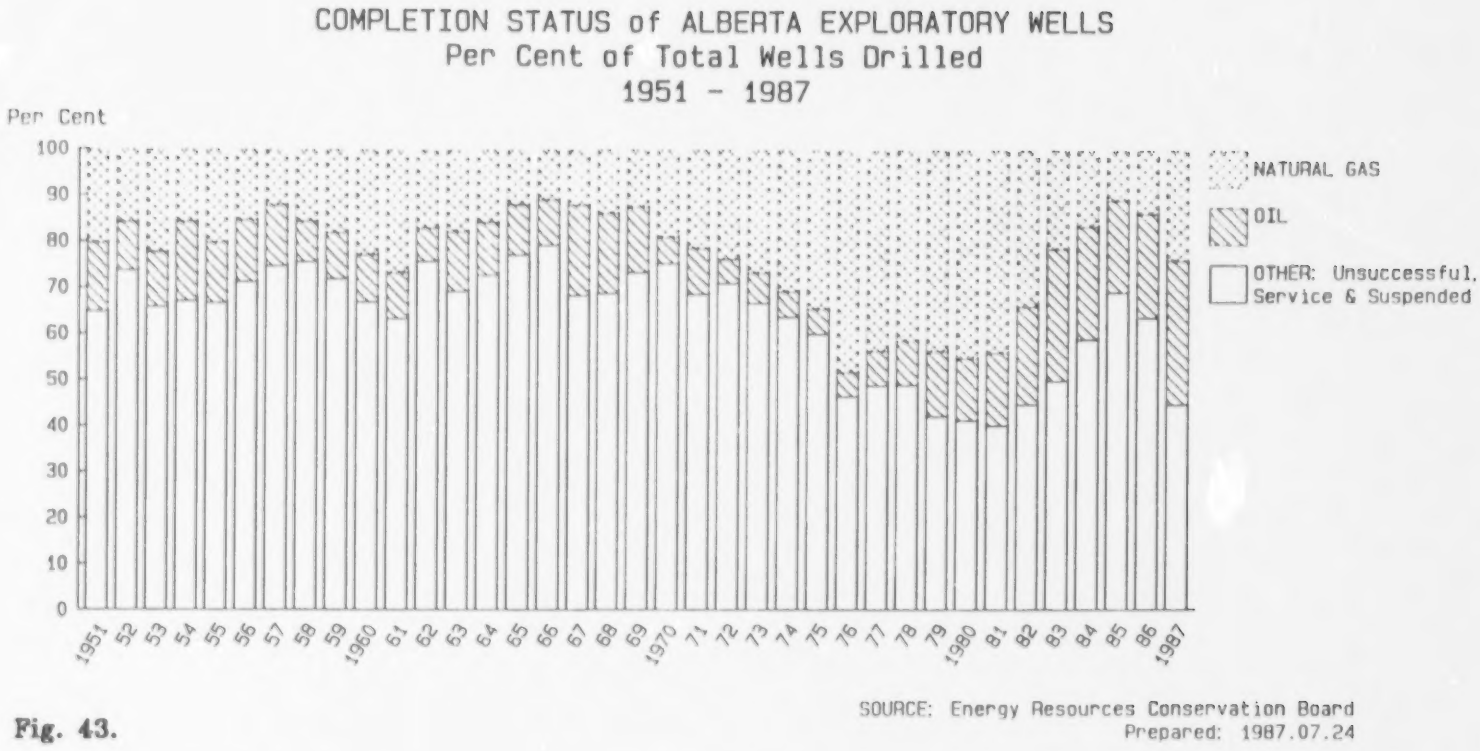

COMPLETION STATUS of ALBERTA EXPLORATORY WELLS
Per Cent of Total Wells Drilled
1951 - 1987
Per Cent
100
90
80
70
60
50
40
30
20
10
0
1951
52
53
54
55
56
57
58
59
1960
61
62
63
64
65
66
67
68
69
1970
71
72
73
74
75
76
77
78
79
1980
81
82
83
84
85
86
1987
NATURAL GAS
OIL
OTHER: Unsuccessful, Service & Suspended
SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

Fig. 43.

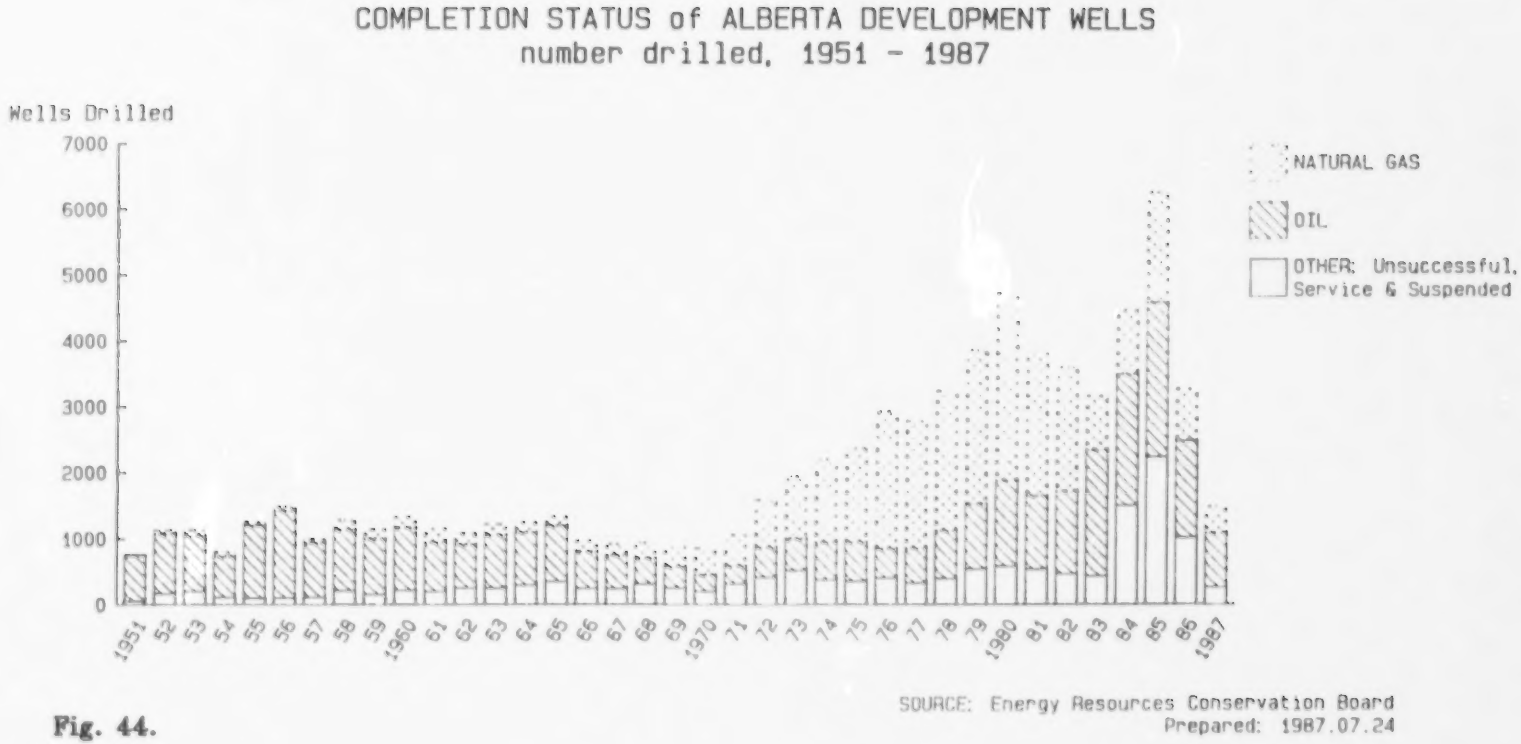

COMPLETION STATUS of ALBERTA DEVELOPMENT WELLS
number drilled, 1951 - 1987
Wells Drilled
7000
6000
5000
4000
3000
2000
1000
0
NATURAL GAS
OIL
OTHER: Unsuccessful, Service & Suspended
1951 52 53 54 55 56 57 58 59 1960 61 62 63 64 65 66 67 68 69 1970 71 72 73 74 75 76 77 78 79 1980 81 82 83 84 85 86 1987
SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

Fig. 44.

COMPLETION STATUS of ALBERTA DEVELOPMENT WELLS
Per Cent of Total Wells Drilled
1951 - 1987

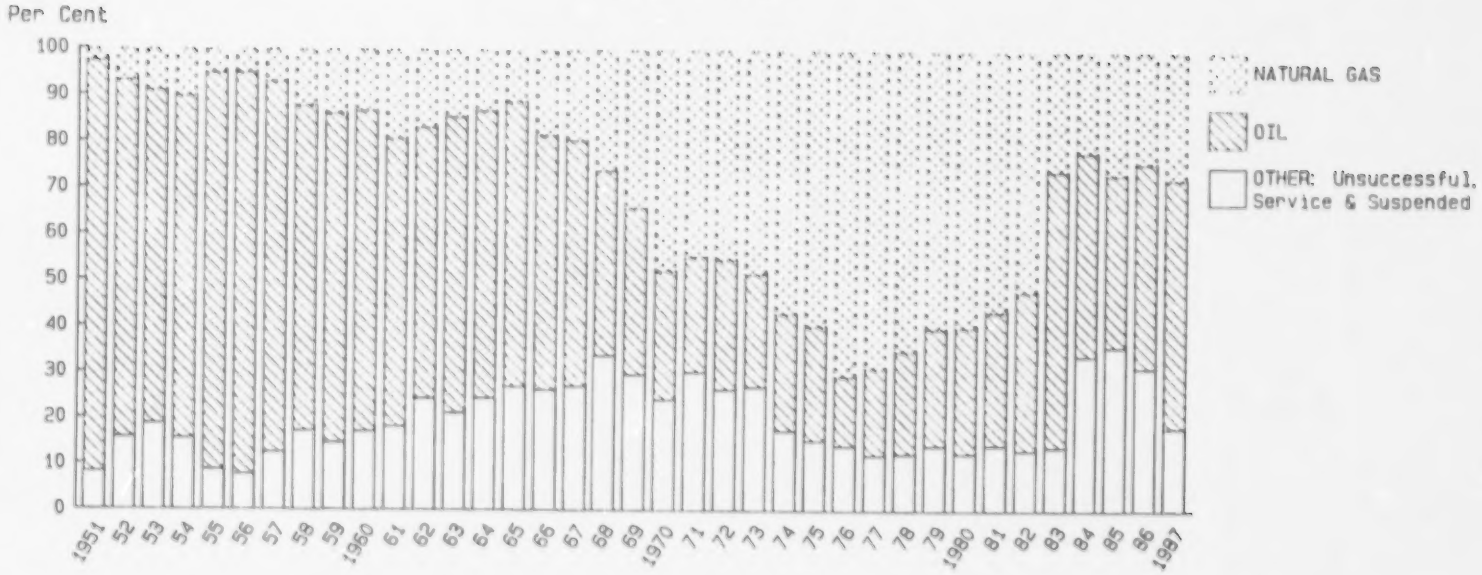


Fig. 45.

SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

Of all wells drilled in Alberta since 1950, exploratory wells have ranged from 20 to 50 per cent, averaging 34. The reasons for the fluctuation are many, including oil and gas prices, market access, regulatory policies and drilling incentive programs. Since 1950, however, the companies have never allowed their exploratory wells to average less than 20 per cent of wells drilled (Figure 46) no matter how adverse conditions for exploration appeared to be.

Gas markets in the United States have been slow to increase recently and both exploratory and development completions for gas have lately declined. Following brief declines in both exploratory and development drilling induced by the 1983 and 1986 oil price drops, drilling activity is again on the rise (Figure 47). Exploratory drilling success for oil is rising (Figure 48) and that for gas is dropping, but the relationship between the two is, as suggested earlier, largely dependent upon what the particular company is looking for, and where.

More significantly, however, overall (oil and gas) success of this market-driven activity has declined steadily since 1980. From an overall government policy standpoint, it indicates the need to ensure the financial environment encourages the development of enhanced recovery schemes for conventional oil and the recovery of additional oil from surface and subsurface bitumen-bearing deposits, notably by allowing early recovery of the higher-per-barrel initial investment than is required for conventional oil.

In terms of Alberta's current conventional reserves, slightly more has been produced than is remaining (Figure 49). Remaining in-place bitumen reserves, however, are some 30 times greater than those of conventional oil. This is why such a major research effort, through the Alberta Oil Sands Technology Research Authority, is being sustained by the Alberta government.

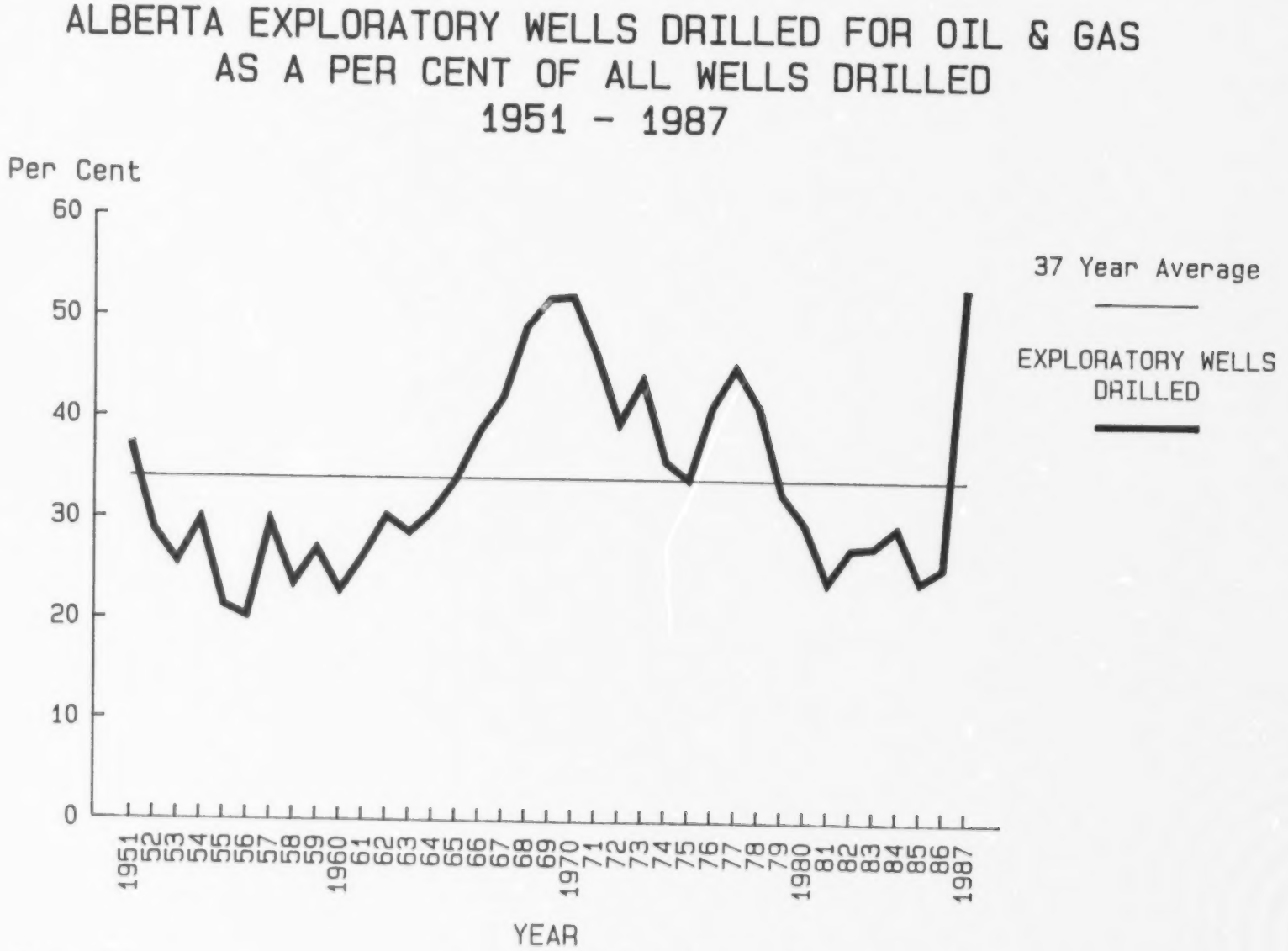

ALBERTA EXPLORATORY WELLS DRILLED FOR OIL & GAS
AS A PER CENT OF ALL WELLS DRILLED
1951 - 1987
Per Cent
60
50
40
30
20
10
0
37 Year Average
EXPLORATORY WELLS DRILLED
1951 52 53 54 55 56 57 58 59 1960 61 62 63 64 65 66 67 68 69 1970 71 72 73 74 75 76 77 78 79 1980 81 82 83 84 85 86 1987
YEAR

Fig. 46.

SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

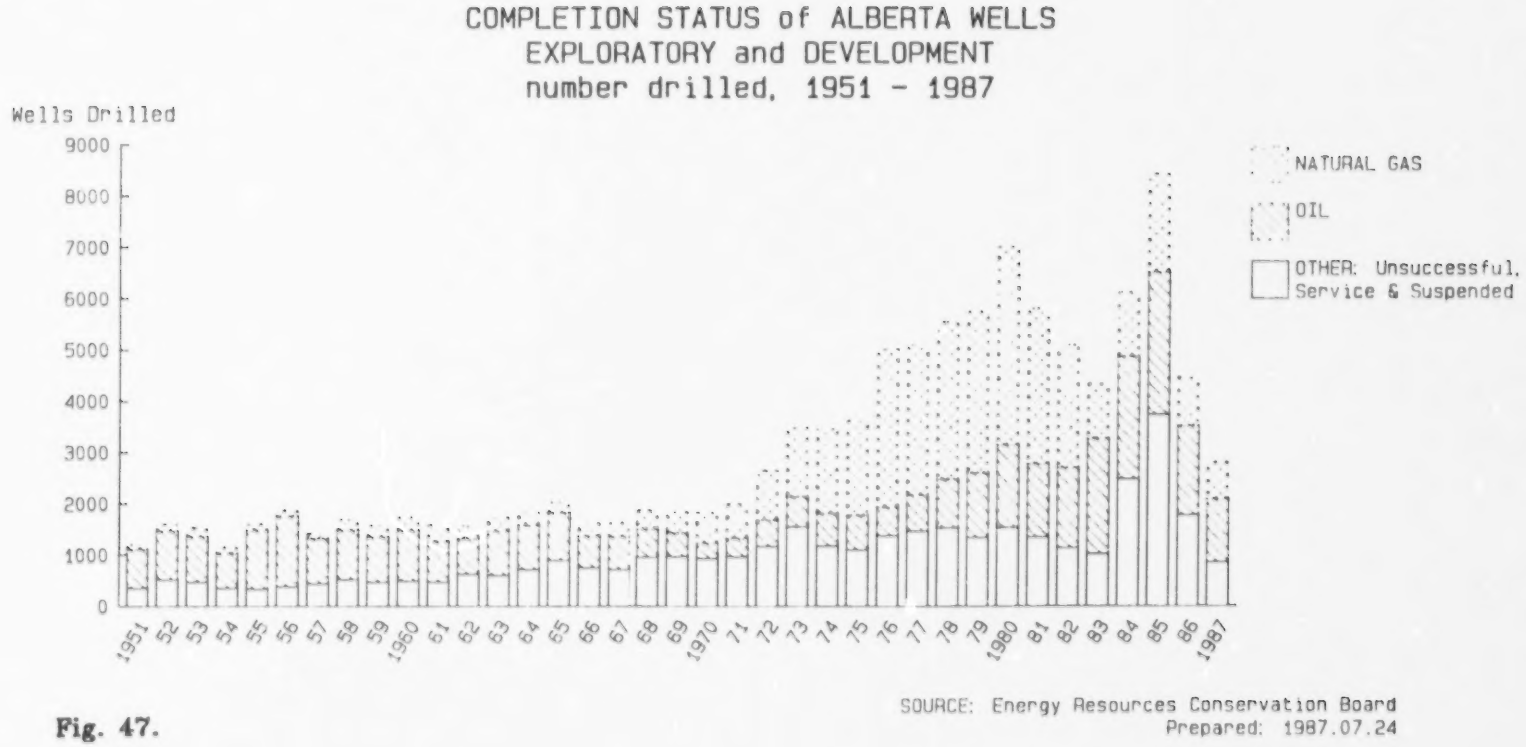

COMPLETION STATUS of ALBERTA WELLS
EXPLORATORY and DEVELOPMENT
number drilled, 1951 - 1987
Wells Drilled
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1951
52
53
54
55
56
57
58
59
1960
61
62
63
64
65
66
67
68
69
1970
71
72
73
74
75
76
77
78
79
1980
81
82
83
84
85
86
1987
NATURAL GAS
OIL
OTHER: Unsuccessful, Service & Suspended
SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

Fig. 47.

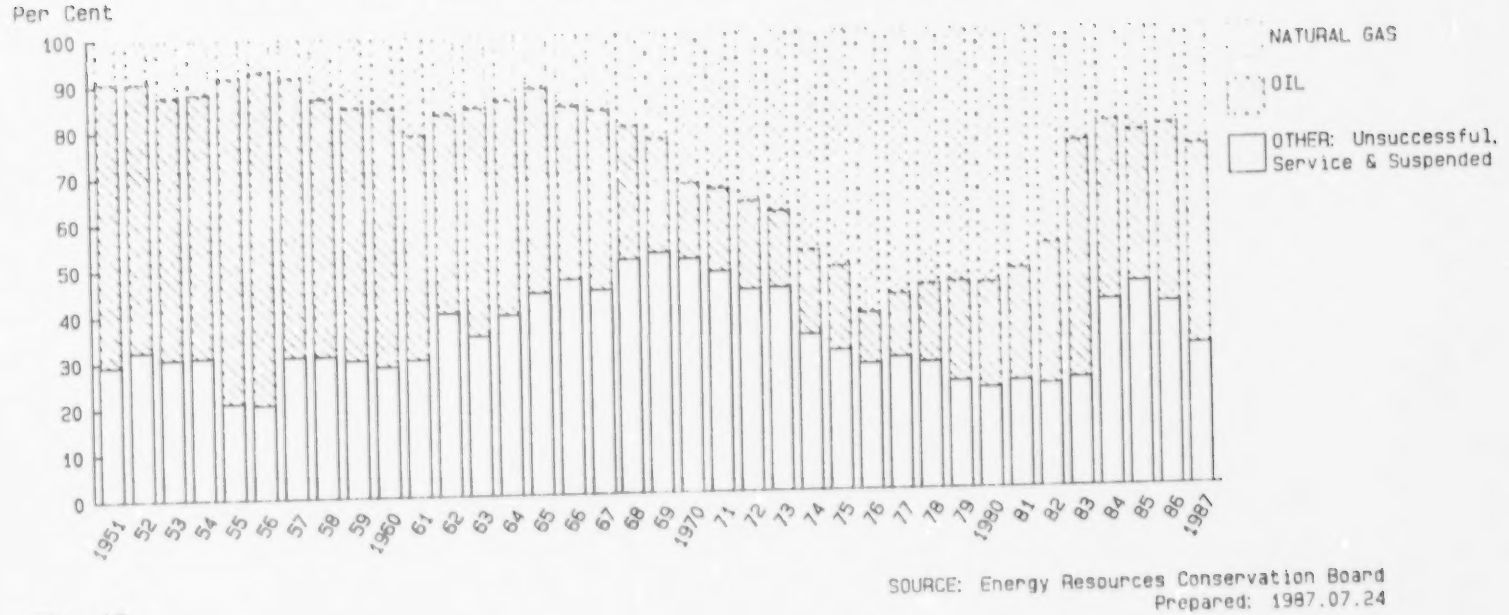
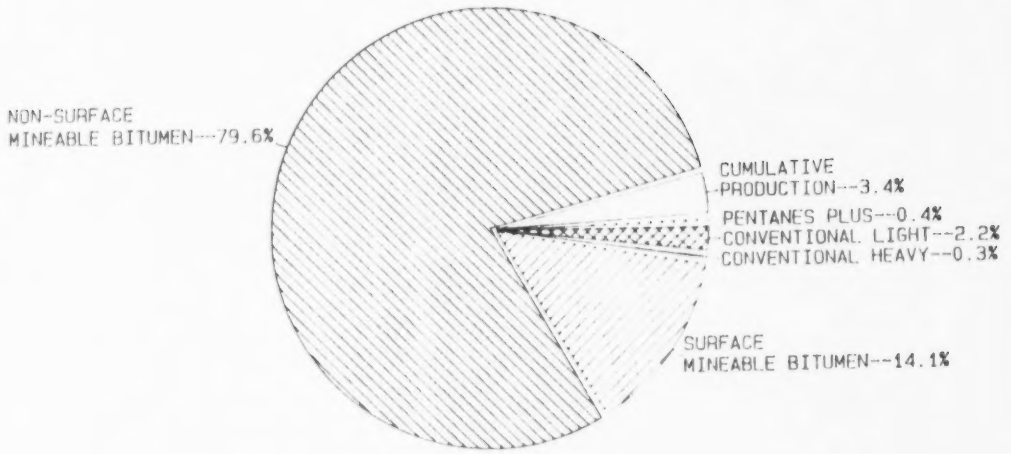

COMPLETION STATUS of ALBERTA WELLS
EXPLORATORY and DEVELOPMENT
Per Cent of Total Wells Drilled, 1951 - 1987
Per Cent
100
90
80
70
60
50
40
30
20
10
0
1951
52
53
54
55
56
57
58
59
1960
61
62
63
64
65
66
67
68
69
1970
71
72
73
74
75
76
77
78
79
1980
81
82
83
84
85
86
1987
NATURAL GAS
OIL
OTHER: Unsuccessful, Service & Suspended
SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

Fig. 48.

REMAINING POTENTIAL OF
ALBERTA CRUDE OIL & EQUIVALENT



SOURCE: Energy Policy, Analysis & Planning
Prepared: 1987.07.24

Fig. 49.

The result of providing an environment in which, since 1950, the private sector has drilled some 110,000 wells (at an average rate of 3,100 per year, including those drilled for bitumen) can be expressed in terms of reserves.

Taken over the past 35 years, the growth of initial cumulative reserves of oil in Alberta (Figure 50) is approximately linear, except for the higher rate of addition evident between 1963 and 1970. The substantial increase in 1964 (Figure 51) is primarily the result of recognition of enhanced recovery efficiency in new fluid injection schemes and improved recovery efficiency in existing schemes. The decrease in 1976 is also due to reassessment of enhanced recovery schemes based on experience acquired. Production levels, however, have exceeded oil reserve additions for the past 16 years and remaining reserves are declining (Figure 50). At 1986 production rates Alberta has a conventional crude oil life index of 12 years.

Initial cumulative gas reserves have also grown more or less linearly (Figure 52) and the tapering off noted for the past five years is no more marked than that experienced from 1969 to 1972. Production has continued to rise, however (Figure 53), and the decline in remaining reserves for the past five years is somewhat longer and steeper than we have previously encountered (Figure 52). At 1986 production rates Alberta has a gas life index of 25 years.

The government of Alberta derives revenue from the production of its oil and gas by the private sector through the collection of a royalty (Figure 54). While basic rates are subject to change, this is done essentially only in response to factors outside the province's control.

Various forms of incentive to reduce the cost of exploration have been attempted at times when depressed world oil prices have lowered levels of activity and caused the loss of jobs.

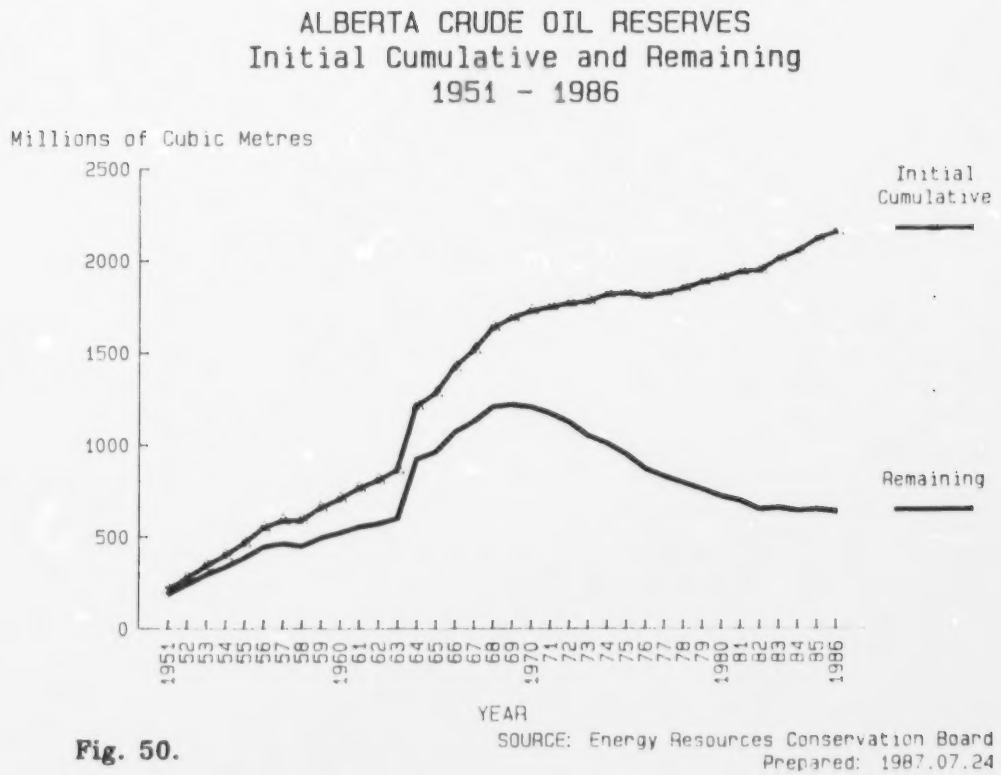

ALBERTA CRUDE OIL RESERVES
Initial Cumulative and Remaining
1951 - 1986
Millions of Cubic Metres
2500
2000
1500
1000
500
0
Initial Cumulative
Remaining
1951 52 53 54 55 56 57 58 59 1960 61 62 63 64 65 66 67 68 69 1970 71 72 73 74 75 76 77 78 79 1980 81 82 83 84 85 1986
YEAR
SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

Fig. 50.

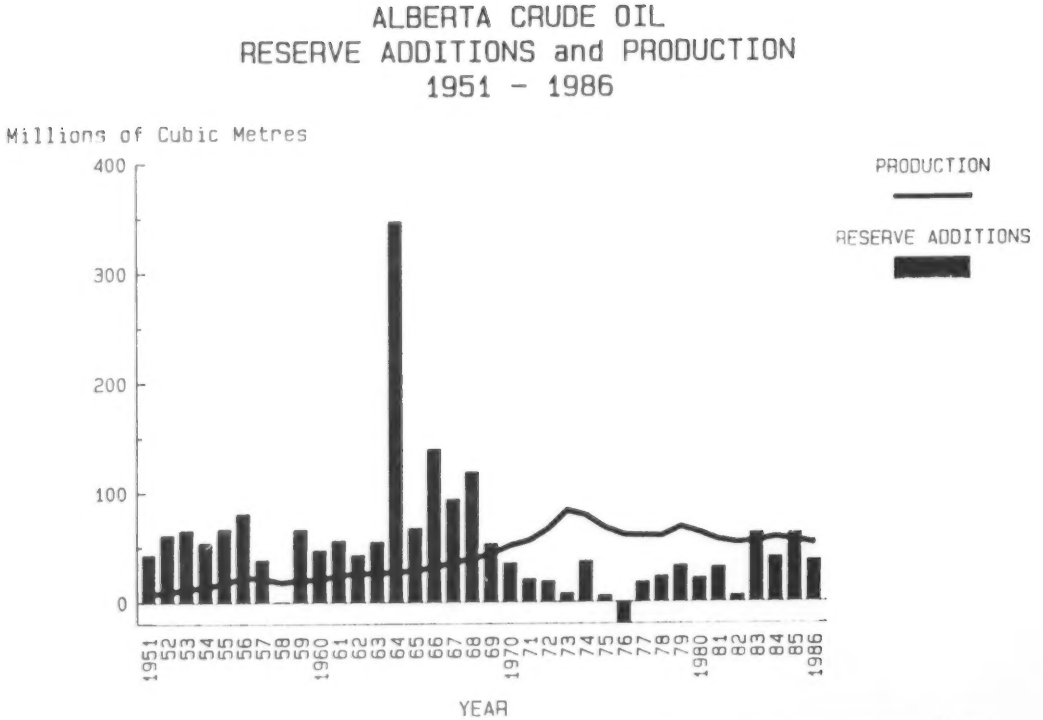

ALBERTA CRUDE OIL
RESERVE ADDITIONS and PRODUCTION
1951 - 1986
Millions of Cubic Metres
400
300
200
100
0
PRODUCTION
RESERVE ADDITIONS
1951 52 53 54 55 56 57 58 59 1960 61 62 63 64 65 66 67 68 69 1970 71 72 73 74 75 76 77 78 79 1980 81 82 83 84 85 1986
YEAR
SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

Fig. 51.

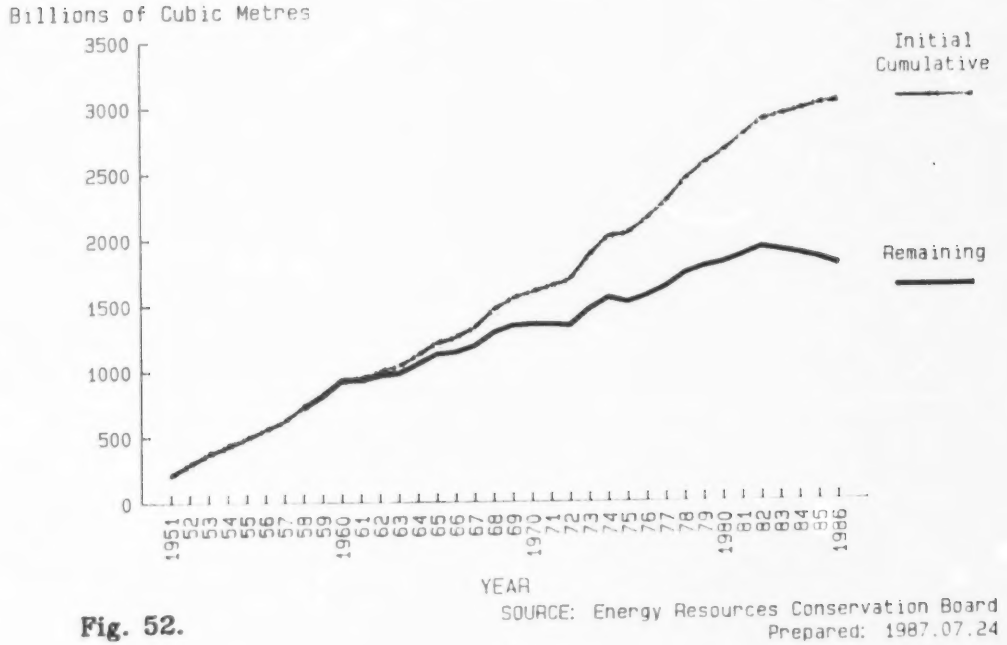

ALBERTA NATURAL GAS RESERVES
Initial Cumulative and Remaining
1951 - 1986
Billions of Cubic Metres
3500
3000
2500
2000
1500
1000
500
0
Initial Cumulative
Remaining
1951 52 53 54 55 56 57 58 59 1960 61 62 63 64 65 66 67 68 69 1970 71 72 73 74 75 76 77 78 79 1980 81 82 83 84 85 1986
YEAR
SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

Fig. 52.

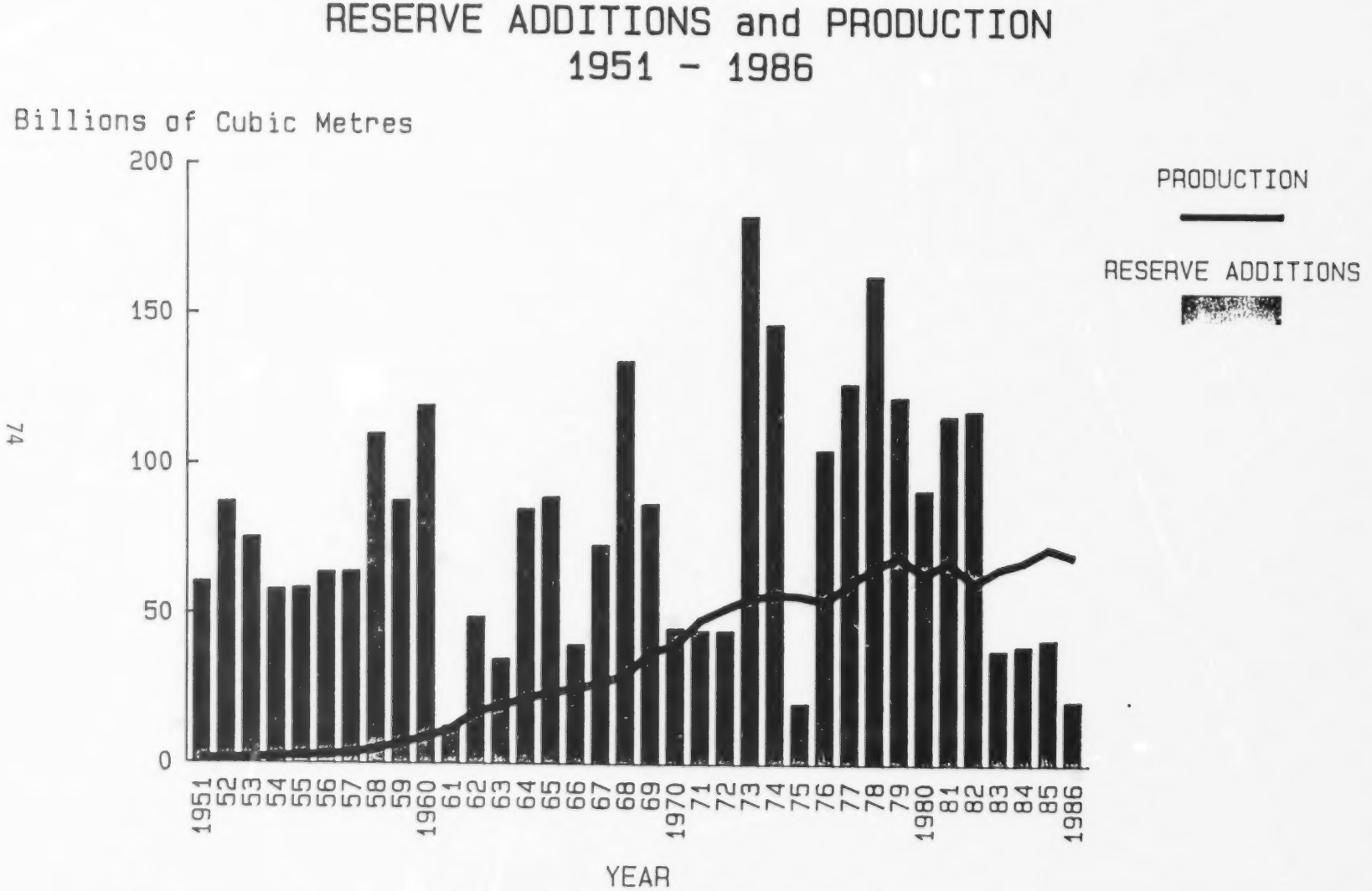


Fig. 53.

SOURCE: Energy Resources Conservation Board
Prepared: 1987.07.24

COMMODITY	ROYALTY CHARACTERISTICS	RATE *
A. CRUDE OIL		
1. CONVENTIONAL	- INCREASES WITH WELL PRODUCTIVITY AND PRICE - HIGHER BASE RATE FOR OIL DISCOVERED PRIOR TO 1974 - NO ALLOWANCE FOR REFINING COSTS	AVERAGE GROSS = 28.94% LESS: HOLIDAYS ENHANCED OIL RECOVERY RELIEF TAX CREDITS INCENTIVE = 14%
2. NON-CONVENTIONAL	- NEGOTIATED BUT ARE TRENDING TOWARDS A PROFIT-SENSITIVE "GENERIC-REGIME"	BEFORE PROJECT PAYOUT: 1% ESCALATING WITH TIME TO 5% OF GROSS REVENUES AFTER PROJECT PAYOUT: 30% OF (REVENUE LESS COSTS) OR 5% GROSS REVENUES WHICHEVER IS GREATER
B. NATURAL GAS		
1. METHANE AND ETHANE	- INCREASES WITH WELL PRODUCTIVITY AND PRICE - HIGHER BASE RATE FOR GAS DISCOVERED PRIOR TO 1974 - ALLOWANCE FOR GAS PROCESSING COSTS	AVERAGE GROSS = 34% LESS: HOLIDAYS GAS COST ALLOWANCE TAX CREDITS INCENTIVES = 18.58%
2. PROPANE AND BUTANE	FIXED	30%
PENTANES PLUS	SAME AS CONVENTIONAL CRUDE OIL	GROSS = 28.94% NET = 14%
3. SULPHUR	FIXED	16.67%

* BASED ON 1986 OIL PRICE OF U.S. $15 PER BARREL AND GAS AT 80% OF OIL EQUIVALENT PRICE

Fig. 54. ALBERTA ROYALTY SYSTEM

Prepared: 1987 July

Alberta ENERGY

With the earliest form of exploration incentive, companies could earn credit in proportion to the depth of exploratory wells, using a dollar-per-metre schedule which increased with depth and amounted to roughly a third of the "dry hole" (non-production) cost. The credit could be applied against royalty accounts or employed in the competitive bonus bidding process for the acquisition of oil and gas rights. The process required the government to specify the conditions (primarily, being a minimum distance from existing production) under which wells would qualify as being exploratory. Three types of problems immediately arose; first, the distance criteria did not always make sense geologically; and second, companies would move their wells to less-than-ideal locations in order to qualify for the incentives; third, it was found that the credit for very shallow wells in some areas amounted to substantially more than the intended one-third of cost. Although generally popular, this incentive scheme was therefore less than ideal.

Field geophysical operations also received credit incentives on a special dollar-per-kilometre basis intended to cover roughly a third of costs. Although schedules for the establishment of credit were arrived at after close consultation with geophysical industry specialists, geophysics - in common with any technology involving electronic processing - was evolving rapidly; too rapidly for even our legislation to keep pace. Some operators were able to shoot and sell regional "speculative" surveys to several clients on a far lower cost per kilometre than had been considered when the schedules were originally arrived at. Again, while the incentive systems may have kept workers employed - and the importance of this should not be underestimated - they were less than ideal as a form of public investment.

Subsequent incentive systems have paid in cash a specified percentage (again, roughly a third) of actually incurred drilling and geophysical costs, rather than on the basis of pre-determined depth or distance schedules. Later, when the governments' cash flow was being

eroded by depressed oil prices the cash feature was replaced by credit against companies' future overall (i.e., not specific well) royalty. The disadvantage of these systems is that they require large staffs of auditors to verify the companies' expenditures.

Finally, Alberta incentive systems were, with strong industry support, switched to reward success rather than effort. This was done by granting a "forgiveness" or "holiday" from the payment of royalty for a period of time following the commencement of production from an exploratory well. This type of incentive allows a much faster payback on a company's investment in an exploratory well which is successful, and it has almost no influence on the location or depth of the well.

The royalty holiday system is relatively free of abuse, but vigilance on the part of the Department of Energy is necessary to ensure that development wells, adjacent to the discovery well which enjoys the holiday, pay their proper share of royalty.

The government of Canada, however, announced a cash incentive system to help the industry when prices fell in 1986 but overall, it is still preferable to reward success rather than effort.

The overall effect of the various Alberta incentives has been to reduce average net royalties from 35 per cent in 1980 to 12 per cent today in response to the particular difficulties which the industry has encountered (Figure 55).

Whatever system exists for the measurement and reporting of production, the collection of royalty, or the awarding of incentives, the relationship between the companies and the government is absolutely critical.

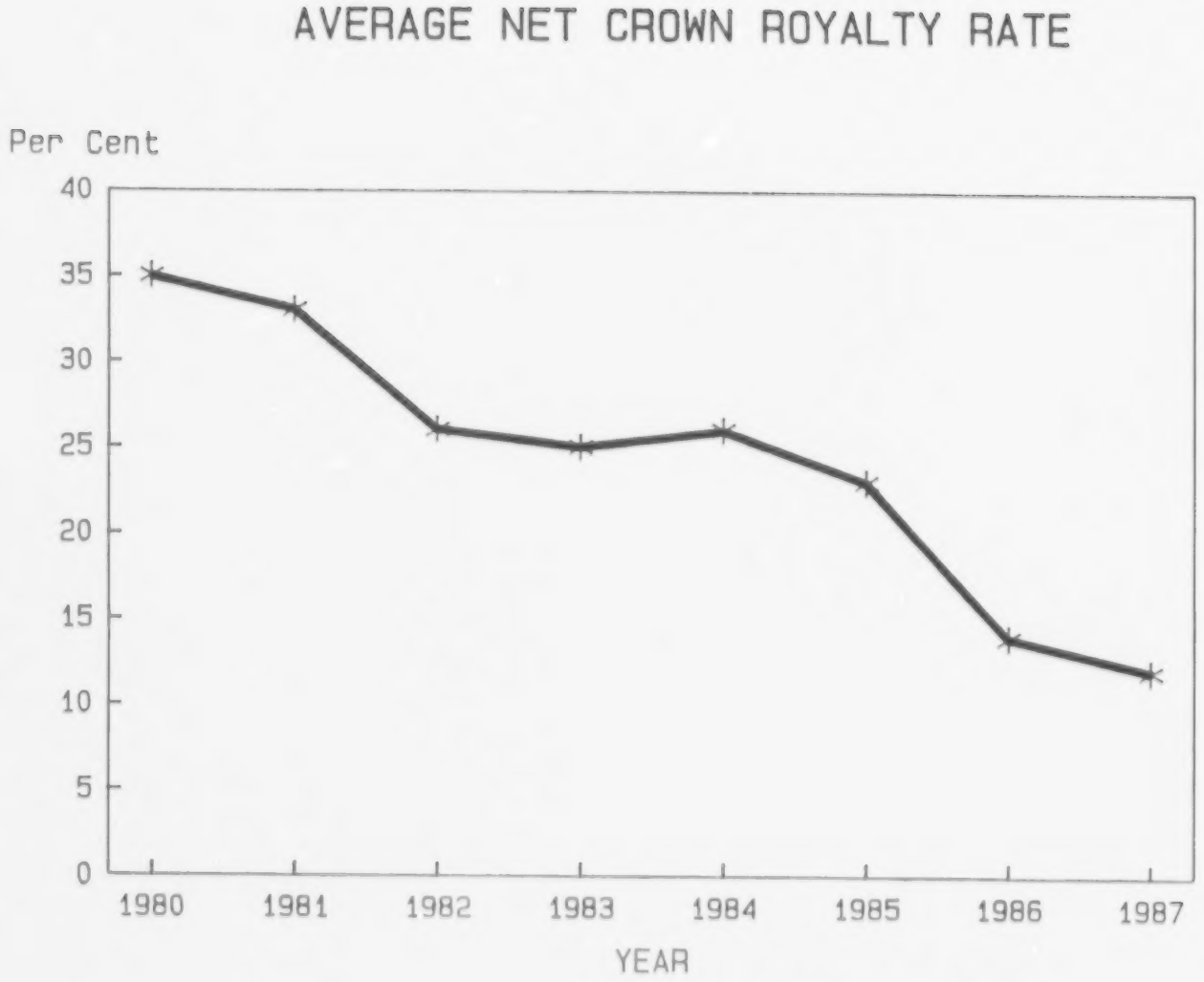


Fig. 55.

SOURCE: 1987 Budget Address
Prepared: 1987.07.24

Historically, the companies complain most loudly when they perceive the rules of the game to be changing whilst the game is in progress. But the trans-national major companies recognize that fluctuation in world supply and price cannot fail to have a profound effect upon the economies of producer countries. They also recognize that while producer countries are indirectly competing for oil company investment dollars they are not about to be dictated to by those companies.

On the broadest policy level, therefore, governments should deal with the oil companies - as Winston Churchill once put it in regard to Shell - "carefully". The very nature of the trans-national major company is to place its eggs in many baskets, to be involved in all phases of the energy business from exploration to the sale of the end product; to be involved in all forms of energy, and to be active worldwide.

Rather than assuring companies the rules of the game will remain static, governments should strive to assure companies their investments are secure, that reasonable rates of return on capital invested in geologically successful prospects will be allowed, that some repatriation of capital will be allowed and that production in excess of national needs can be exported.

It has been the Alberta experience that below the broader policy (that is, political) level, extensive authority should be given to senior department officers to advise, recommend and administer policy. In has been mentioned earlier that although in the early stages of exploration of a country, relatively few companies hold relatively few concessions, provision has to be made for an increase in these numbers.

To effectively administer such a complex industry, senior government managers must be sensitive to both government and corporate priorities. They must be able to assess rates of return on a variety of industry projects and their potential effect on national income.

At the operating level, government must have auditors and other inspectors capable of ensuring that safety and other requirements are met and data correctly submitted. Legislation must provide for remedial action to be taken by government managers quickly and effectively. In a highly competitive business, some operators spend a lot of effort attempting to take advantage of shortcomings and imperfections in the legislation. For legislation and administration to be absolutely, technically error-free, the bureaucracy would have to be so large as to be completely unwieldy, costly and slow.

A compromise in the size and authority of the bureaucracy is therefore required. Easy to say, but hard to achieve. Impossible to achieve, however, unless one develops a network of formal and informal contacts with the industry at all levels.

9. THIRTEEN KEY REQUIREMENTS FOR AN EFFECTIVE GOVERNMENT-PRIVATE SECTOR RELATIONSHIP

Thirteen keys to an effective relationship *and the requirements they make upon government in regard to expertise and facilities:*

1. **BUSINESS STABILITY**

   Affirmation by government of stability of major investment policies: extent of participation by local companies; income tax rates, exemptions and write-offs; repatriation of capital and earnings; other taxes and duties, etc.

   Requires: economics and tax specialists familiar with economic regimes elsewhere in the world.

2. **GEOPHYSICAL ACCESSIBILITY**

   Ability to conduct geophysical exploration without an oil and gas rights agreement.

   Requires: effective approval process and field inspectors.

3. **BIDDING SIMPLICITY**

   A system for the acquisition of oil and gas rights that involves the competitive bidding of only one variable (money, work or a pre-determined combination of them or other factors).

   Requires: managers familiar with oil and gas rights systems elsewhere in the world, preferably including Alberta.

4. **WORKSITE SAFETY**

Clear requirements for ensuring safety of workers, wells and other facilities.

Requires: local managers with adequate authority, supported by fast lines of communication to senior engineers and authorities when required.

5. **ENVIRONMENTAL PROTECTION**

Operators should be aware of requirements to protect air, water and land-related resources.

Requires: realistic requirements and consultation with local interests prior to and during operations.

6. **INFORMATION DISCLOSURE**

Stringent exploration, development and production data submission and disclosure requirements.

Requires: facilities to store and retrieve geophysical data, cores, cuttings, logs and other information and engineers, geologists and geophysicists to process and interpret for purposes of resource evaluation and reservoir management.

7. **TURNOVER OF RIGHTS**

Clear rules for ensuring return to the government of non-productive oil and gas rights.

Requires: petroleum geologists and, preferably, familiarity with Alberta systems.

8. **RESOURCE REVENUE REASONABLENESS**

Consistent reasonableness in the extent to which the governments will derive revenue from production, whether by royalty (including the provision of success- rather than activity-related incentives) or production-sharing, etc. Resource revenue systems should be "robust", i.e., capable of accommodating reasonably foreseeable swings in world oil price without having to be adjusted.

Requires: economists, production accountants and auditors.

9. **RESOURCE RECOVERY**

Regulatory control to ensure optimum field recovery methods.

Requires: petroleum engineers.

10. **PRODUCER EQUITABILITY**

Provision for multiple operators to equitably participate in the development of a reservoir and in the transportation and processing or refining of the fluids obtained.

Requires: petroleum engineers, and provision for parties involved to bring cases of alleged inequity to an impartial technical tribunal.

11. **UPGRADING**

Producers should understand the extent to which crude products are required to be upgraded.

Requires: refinery and chemical engineers and economists.

12. **DOMESTIC MARKETING**

Producers should understand the extent and manner in which they may market within the country.

Requires: market analysts.

13. EXPORT MARKETING

Producers should understand the principles which apply to export of unrefined and refined substances.

Requires: Supply and demand forecasters, economic modellers and international market analysts.

In conclusion, it should be stressed that the entire business environment in which the private sector is invited to invest, including all of the previous 13 key areas, and any contemplated changes in that environment, should be the subject of frequent discussion with the private sector. In the experience of the government of Alberta, the private sector may not always agree with government requirements, but the message is far more likely to be well accepted when accompanied by thorough and sincere discussion.

THIRTEEN KEY REQUIREMENTS FOR AN EFFECTIVE
GOVERNMENT-PRIVATE SECTOR RELATIONSHIP

1. BUSINESS STABILITY
2. GEOPHYSICAL ACCESSIBILITY
3. BIDDING SIMPLICITY
4. WORKSITE SAFETY
5. ENVIRONMENTAL PROTECTION
6. INFORMATION DISCLOSURE
7. TURNOVER OF RIGHTS
8. RESOURCE REVENUE REASONABLENESS
9. RESOURCE RECOVERY
10. PRODUCER EQUITABILITY
11. UPGRADING
12. DOMESTIC MARKETING
13. EXPORT MARKETING

Fig. 56